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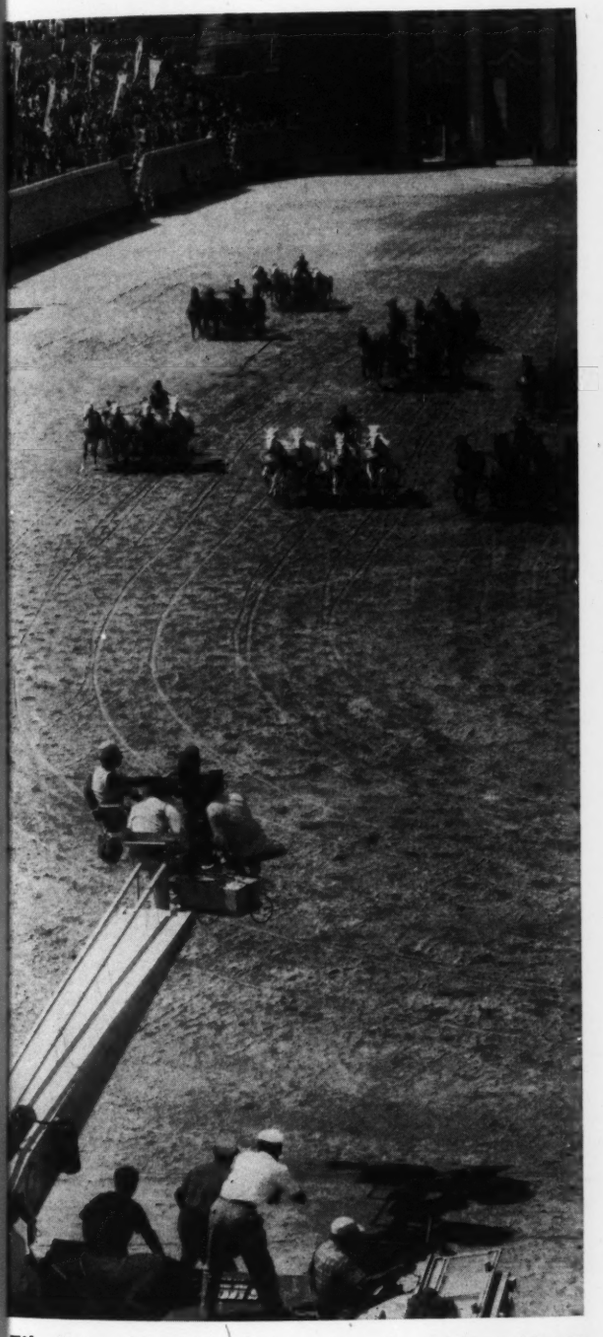

Filming the chariot race for "Ben-Hur"
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Mike Todd Jr.'s "Smell-O-Vision" scent projector
—Page 92

Cinematography in ophthalmology
—Page 106

PLUS: Industry News • Questions and Answers • What's New • Assignments

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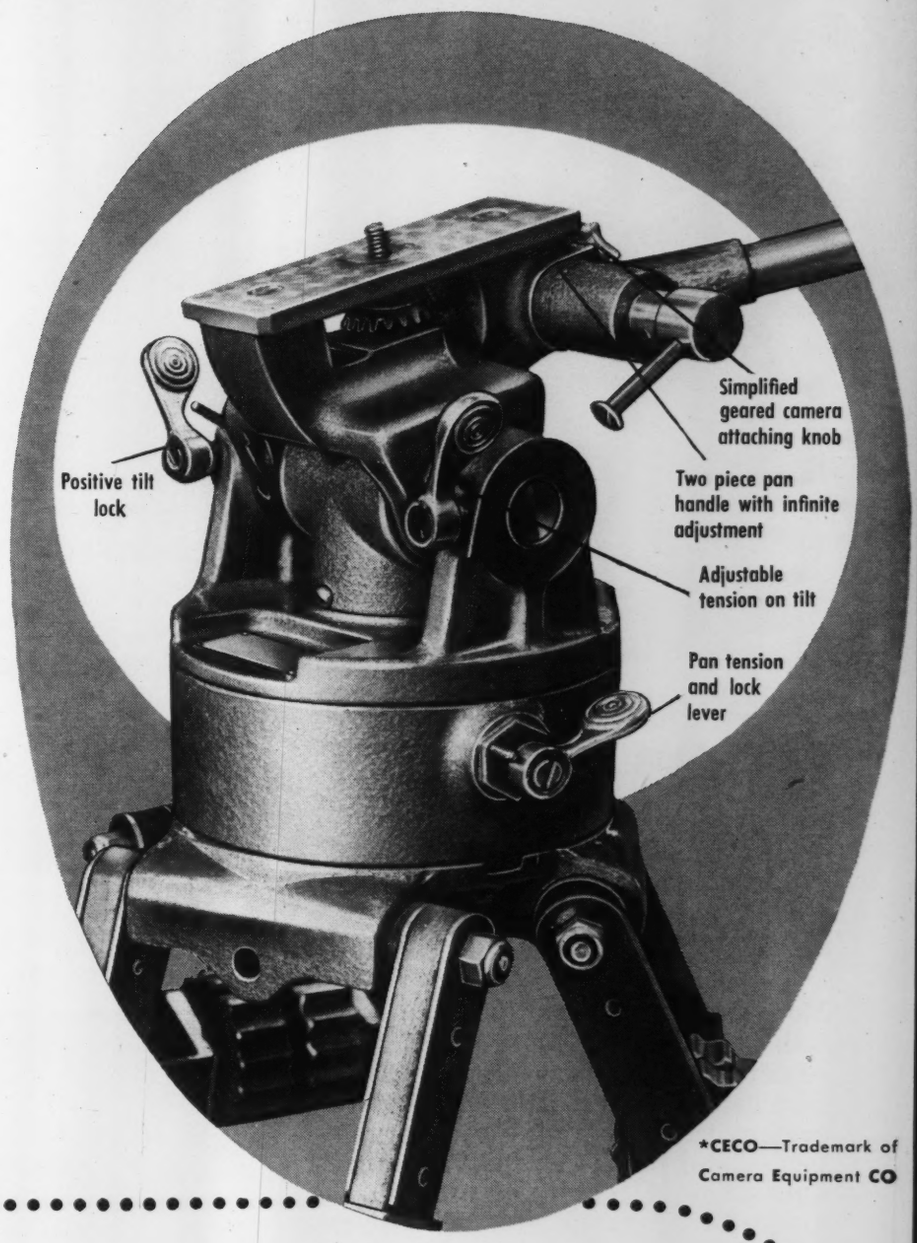
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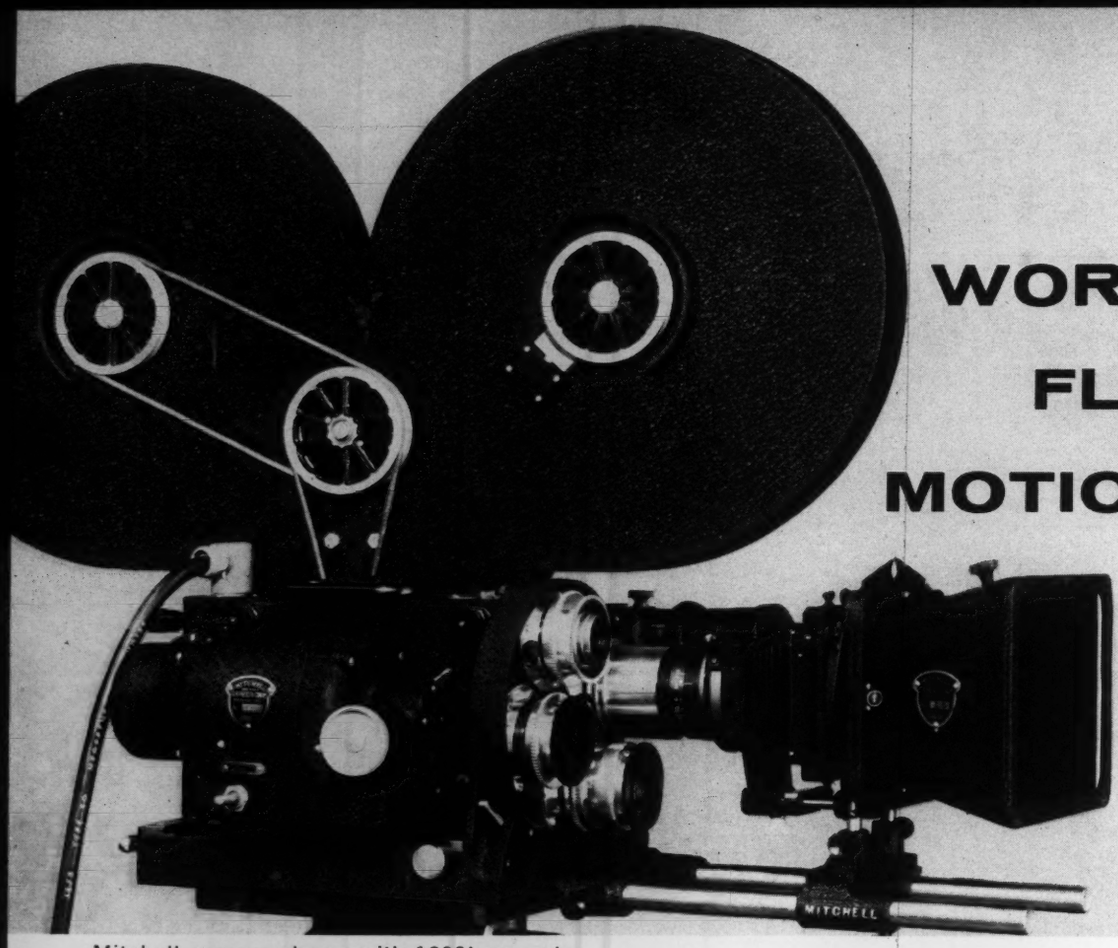

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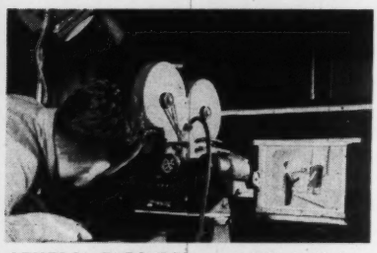

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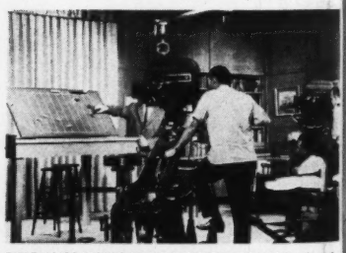

BUD WILKINSON PRODUCTIONS shoots its award-winning TV Sports Series with the Mitchell.

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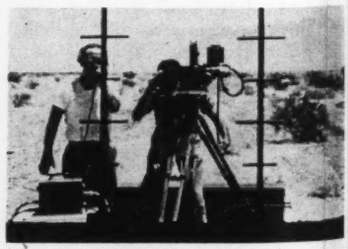

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February, 1960 • Vol. 41, No. 2

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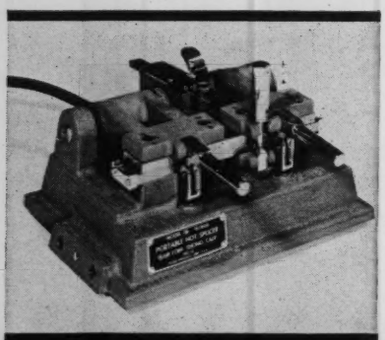

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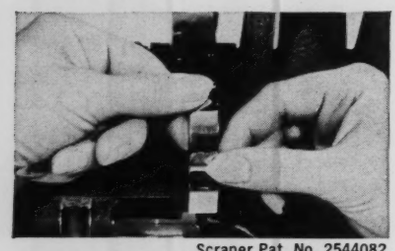

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INDUSTRY NEWS

News briefs of industry activities, products and progress

Mitchell's Reflex Camera

In the works but still under wraps is an advanced portable motion picture camera by Mitchell Camera Corp., featuring through the lens reflex viewing.

Long rumored as a possibility, the camera is now in the prototype stage with actual manufacture still some time in the future.

Most notable feature: inverted film magazine (under instead of on top of, the camera) which serves also as a shoulder pod for the camera.

★

Researching Film Reproduction on TV

The Motion Picture Research Council, Inc., Hollywood, which has recently expanded its activities to include research of the effects and limitations of motion uicture film in television transmission, has installed a complete film-to-monitor closed-circuit TV system for color and black-and-white.

Beginning February 4, the Council will conduct a series of demonstrations exclusively for members of the American Society of Cinematographers, which will show the limitations of film reproduction and their effects on television film photography.

The cinematographers, who photograph most of the television films presently made in Hollywood, thus will be able to apply the Council's research findings to their daily filming, with consequent improved transmission potentials in their films.

★

Hollywood testing new E-K film

Sample rolls of a new Eastman black-and-white negative film, both 16mm and 35mm, have been distributed among Hollywood studios and film laboratories for testing. Carrying the experimental number 49351, film is expected to meet needs of TV film producers for a faster negative minus grain.

New film is rated ASA 250 for daylight and ASA 160 for tungsten, as compared with the present ratings of Plus-X of ASA 80 and 64. This makes new film 1½ stops faster than Plus-X and ⅓ stop slower than Tri-X, with graininess reportedly less than that of Tri-X.

As one E-K spokesman put it, the new film is closer to Tri-X in speed and to Plus-X in in grain.

If present tests are successful, it is likely the new film will find ready acceptance in TV film production, where extreme speed and minimum graininess of emulsion is essential. Because the new E-K film is still in the experimental stage, no date has been set for marketing it in quantities.

★

Annual award for college cinema students

Following the induction of Jack L. Warner into the University of Southern California Chapter of Delta Kappa Alpha, national cinema fraternity, the president of Warner Brothers' studio announced in his acceptance speech the establishment of a Sam L. Warner Memorial Opportunity Award.

According to Warner, during the ten year tenure of the award, his studio will guarantee six months employment each year to a USC cinema student to be selected by the faculty as most deserving of the opportunity. USC conducts one of the most important and successful cinema classes in the country among universities and colleges.

★

First feature to be filmed entirely in Tri-X

Jack Cardiff, who until he became a screen director was one of Britain's leading directors of photography, has announced that "Sons and Lovers," which he will direct for 20th Century-Fox, will be shot entirely on ultra-fast Tri-X negative. Step marks an innovation in major feature film photography, inasmuch as Tri-X heretofore has been used chiefly for filming scenes under extreme adverse light conditions where only an ultra-fast emulsion would render satisfactory results.

Cardiff, who turned to directing after a highly successful career as a cameraman, was in Hollywood recently in preparation for the Fox production. He explained that he wants the camera to

Continued on Page 70

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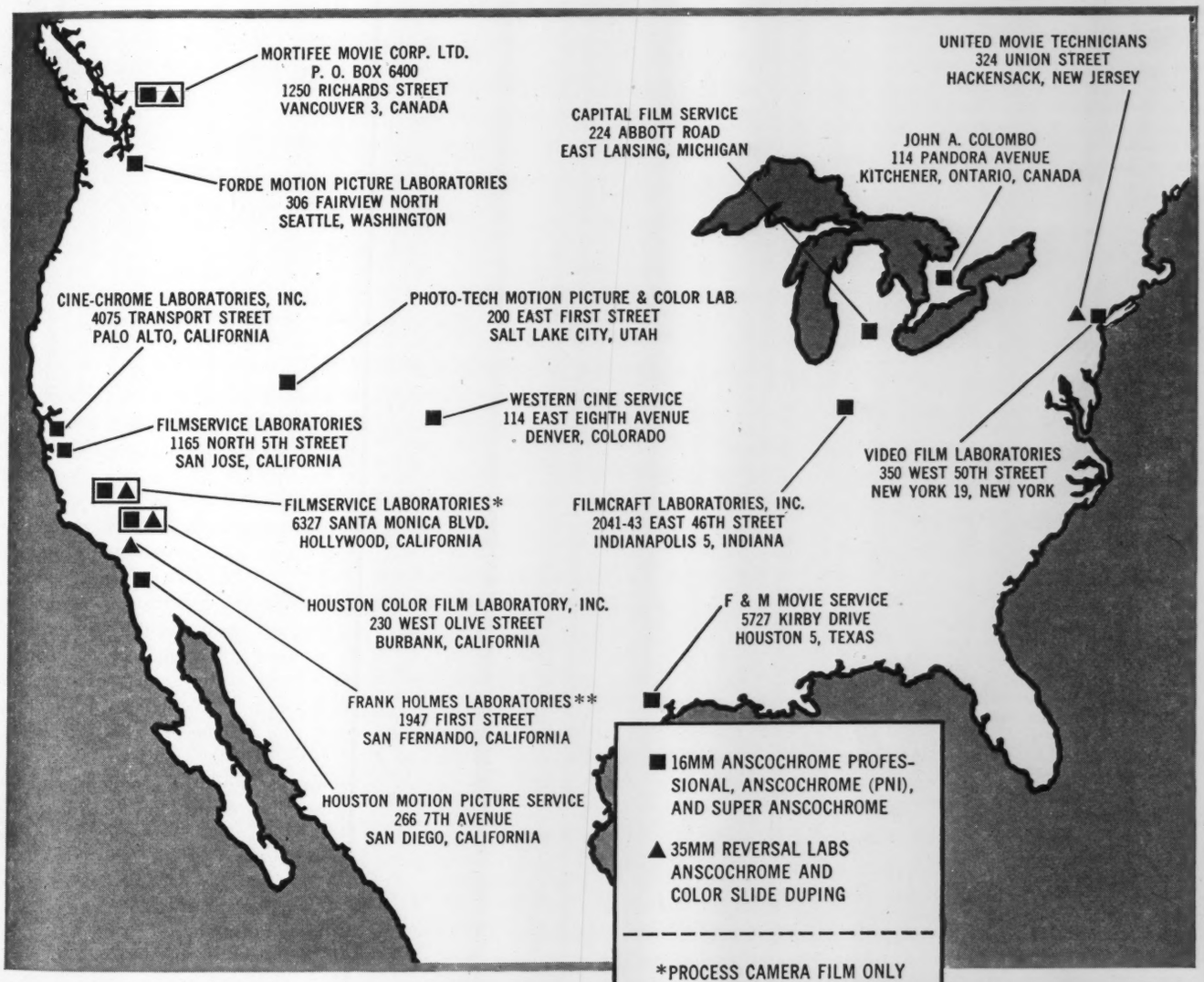

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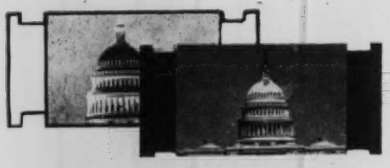

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INDUSTRY NEWS

Continued from Page 68

achieve an effect of reality without being arty or pretty—to obtain the effect of having shot the action as it was found and without having been staged.

★

Flaherty Award competition

Competition for the eleventh annual Robert J. Flaherty Award in the documentary film, sponsored by the City College Institute of Film Techniques, New York City, has been announced by Yael Woll, director of the film institute.

Producers of documentary films are invited to submit entries for the 1959 competition between now and February 15th. Entry blanks and information are obtainable from the Institute of Film Techniques at City College's Steiglitz Hall, 133rd Street and Convent Avenue, New York 31, N. Y.

Prize-winning films will be announced at a screening held in conjunction with Cinema 16 on March 16, 1960.

★

Animation Seminar Scheduled

A four-day seminar and workshop on animation film techniques, sponsored by Florman & Babb, Inc., 68 West 45th Street, New York, N.Y., is set for June.

The seminar is planned basically to aid the small film producer with little or no experience in animation, and to demonstrate how almost any type of animation can be produced successfully with a minimum of low-cost equipment.

Morning workshop sessions will be conducted by Warren Portman, Charles Lipow, and Arthur Florman. In the afternoons, seminars will be conducted by a group of top New York animators. There will be no charge for for those who attend the four-day workshop-seminar. As attendance is limited to 100 daily, those wishing to attend should register now with Charles Lipow, in care of Florman & Babb, Inc.

★

Entries invited for International Film Festivals

CINE, which stands for the Committee on International Non-theatrical Events, is now soliciting the best of 1959 non-theatrical films for entry in the major international film festivals abroad.

CINE coordinates selection of non-governmental U.S. non-theatrical films at the request of festival authorities for Venice, Edinburgh, and Vancouver.

This year's screening of submitted films will be under the supervision of a newly-elected group of officers, working with newly-elected CINE chairman Ralph L. Hoy. Hoy urges all potential entrants to write immediately for their 1960 entry blanks to CINE, 1201 Sixteenth St., N. W., Washington 6, D. C.

★

New color films named

Eastman Kodak Company's new, fast color reversal films, reported here last month and tentatively identified as SO 260 and SO 270, have been officially christened by Eastman. Henceforth the daylight type will be known as Eastman Ektachrome ER Film, Daylight Type, and its companion, Eastman Ektachrome ER Film, Type B.

The temporary monickers, SO 260 and SO 270, were simply a designation used until a final product name could be determined and the two films put into regular production. The "SO" prefex to the emulsion numbers stands for "special order"—which is what the films were until recently.

★

High-speed photography symposium

The Society of Motion Picture and Television Engineers will conduct its 5th International Congress on High-Speed Photography in Washington, D.C., October 16 through October 22, 1960. An exhibit, in conjunction with the Congress, will include international industrial and governmental displays and demonstrations of high-speed instrumentation systems and equipments.

General headquarters will be in the Sheraton-Park Hotel in Washington, with tours and possibly some meetings away from the hotel, for which transportation will be provided.

Questions or suggestions about the Congress should be directed to the Congress Chairman, Max Beard, c/o the S.M.P.T.E., 55 West 42nd St., New York 36, N. Y.

★

Congress on Medical Cinematography

The 1st Internatioanl Congress on Medical Photography and Cinematography is scheduled for Cologne, Germany, September 27th to 30th, 1960.

In addition to a program of lectures and demonstrations, there will be screenings of medical films and an exhibition of medical and scientific photographs.

201 hours of SLEEPLESSNESS

filmed by AURICON 16 mm Sound-On-Film CAMERA

Auricon Hollywood

Peter Tripp, Ace Disc Jockey for New York Radio Station WMGM, is depicted above after he completed a record 201 hours of sleeplessness in an amazing test of the human body!

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Mr. Tripp was filmed during every hour of his 8 days of sleeplessness by the quiet "self-blimped" Auricon 16mm Super-1200 Sound-On-Film Camera, and the resulting Sound-Pictures were released daily for viewing.

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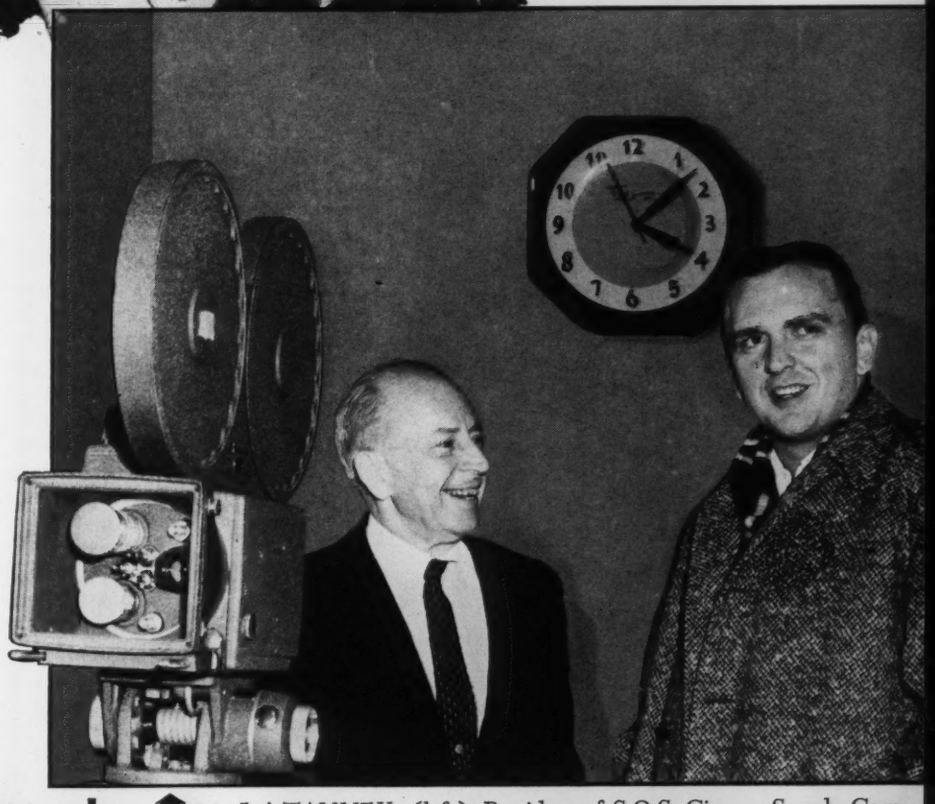

Mr. J. A. TANNEY, (left), President of S.O.S. Cinema Supply Corp., New York City, (Auricon Sound Equipment Dealer for 20 years), furnished the Auricon 16mm Super-1200 Sound-On-Film Camera, shown above. Here he discusses the amazing Sleeplessness experiment with Peter Tripp, shown before the start of the grueling 201 hour test.

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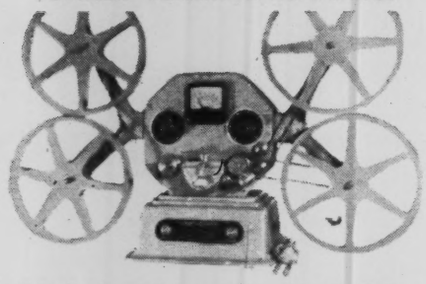

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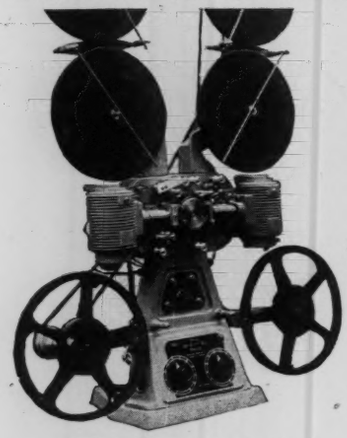

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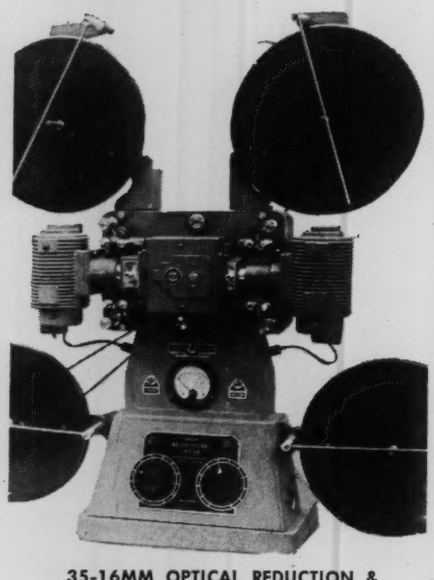

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HOLLYWOOD BULLETIN BOARD

CHARLES G. CLARKE (left), accepts mounted plaque from ASC President Walter Strenge at Testimonial Dinner tendered Clarke by the Society last month. Engraving commemorates Clarke's achievements as Past-President of the Society.

Charles G. Clarke, who served two terms as President of the American Society of Cinematographers (1948-50 and 1951-53) and who has been active on the Society's Board of Directors in one capacity or another almost since he joined the organization over thirty years ago, was honored by the Society with a Testimonial Dinner January 26.

President Walter Strenge, following introduction of Clarke, presented Clarke with an engraved plaque in behalf of the A.S.C., the text of which commemorated his many contributions to the Society and its members. A second presentation was a solid gold currency clip featuring a $20 gold piece bearing Clarke's birth year and engraved in commemoration of the Testimonial Dinner.

William J. German, president of the Eastman Kodak professional film distributing company bearing his name, and who also is an Honorary Member of the A.S.C., was among the several guests who spoke briefly in recollection of Clarke's past achievements.

"His achievements," said Mr. German, "are too numerous to enumerate, but it is a well-known fact that he is one of the real pillars in the foundation and the life and history of the A.S.C."

Speaking of Clarke's work as a director of photography, Mr. German said: "At least half of his camera artistry has been expressed in films photographed outside of the United States —in Europe, India, Africa, Australia, South America, and in the Far East—particularly in Hong Kong where he photographed all of the local sequences of that great picture, "Love Is A Many-Splendored Thing."

• • •

Limelight, weekly industry trade paper published in Hollywood, last month presented its first annual awards for achievement in the motion picture industry during 1959. Achievement categories ranged from Best Motion Picture to Best Motion Picture Song. Artists, technicians, and others cited by *Limelight* were presented with en-

Continued on Page 76

LEON SHAMROY (left) and William Mellor admire Limelight Award presented Shamroy for photography of "Peggy and Bess." Mellor also received one for photography of "The Diary of Anne Frank," as did Robert Surtees for "Ben-Hur."

ARRIFLEX PRESENTS...

NEW DIMENSIONS TO THE VERSATILE ARRI SYSTEM

FOR THEATER-QUALITY SOUND FILMING...

for **extreme wide-angle** filming...

TEGEA 5.7mm f/1.8/T2

SUPER-WIDE-ANGLE LENS

with **built-in filter slot for 2″ square filters**

and **special lens shade.**

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Lip-synch recording with ¼″ tape

The most desired portable professional motion picture camera in the field achieves a new dimension... new production versatility...with this Synchronous Signal Generator. (Illustrated on Arriflex 16—similar installation also available for Arriflex 35.)

Standard battery operates the governor-controlled DC motor on the Arriflex—**no need for generators or invertors to supply AC.** As camera runs, the Synchronous Signal Generator produces a 60-cycle current, which is fed to a special recording head mounted on a tape recorder. This puts a control signal on ¼-inch tape at approximately 90 degrees to the audio signal. In re-recording to film—magnetic or optical—this control track is amplified and controls speed of playback, maintaining frame-by-frame synchronization.

This unit can be installed on all Arriflex models.

*Licensed by and compatible with "Rangertone," Newark, N. J.

write for complete literature

This remarkable retrofocus super-wide lens extends the scope of Arriflex filming for such applications as instrumentation, architecture and interiors, and for special effects. While extreme-wide-angle lenses present finder problems with conventional cameras, the Arriflex, because of its famous mirror-reflex system, is **ideally suited** to the 5.7mm Tegea.

OPTICAL SPECIFICATIONS: Bench-tested and selected according to critical ARRI tolerances. Unusually even coverage of the field in spite of extremely short focal length. Distortion corrected to 1.7° for field of 100°. Superb definition over the entire 16mm frame. Angular field 113°.

DEPTH OF FIELD TABLE based on circle of confusion of .025mm (1/1000″)

Diaphragm setting	Sharp from	To
1.9	19″	infinity
2.8	16″	″
4	14″	″
5.6	12″	″
8	10″	″
11	9″	″
16	8½″	″

APPROXIMATE MECHANICAL SPECIFICATIONS

Overall length beyond lens mount; 4½″; with lens shade; 6″
Front diameter of lens; 3½″
Weight of lens without lens shade; 30 oz.; with shade; 36 oz.
Front dimension of lens shade; 4x6″

ARRIFLEX CORPORATION OF AMERICA
257 PARK AVENUE SOUTH, NEW YORK 10, N. Y.

the CAMART DUAL SOUND READER

DOES IT WORK? IS IT PRACTICAL?

HERE ARE JUST A FEW PROFESSIONAL OPINIONS

LARRY ROSS, MOTION PICTURE DIRECTOR, U. S. ARMY TECHNICAL PHOTO LAB., ABERDEEN PROVING GROUND, MD.: *"In my opinion the Camart Dual Sound Reader is invaluable in editing and synchronizing of our sound documentary films."*

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WABC-TV CHANNEL 7
NEW YORK

November 1, 1956

Mr. Samuel C. Hyman
The Camera Mart, Inc.
1845 Broadway
New York 23, New York

Dear Chick:

The Camart Dual Reader serves just about all of our needs so far as an editor is concerned. This small, compact unit which permits us to view the film and hear the track in synch has virtually eliminated the need for other larger, more cumbersome and costly editing machines.

With work space at a premium, the removal of the amplifier from the unit into a separate chasis which we can put up on a shelf has been particularly helpful.

All in all we have been very satisfied with the Dual Reader and expect that it will continue to be our basic editing tool.

I, unfortunately, do not have any photos of the unit in use. However, if you should want to come up to take some, you are welcome to do so. Of course you are also welcome to bring anyone up for a visit to see us at work as Paul did last week. Best regards, and I am sure the Dual Reader is well on its way to becoming the standard unit for the whole industry as it has been for us.

Sincerely yours,
Tak Kako
Film Director

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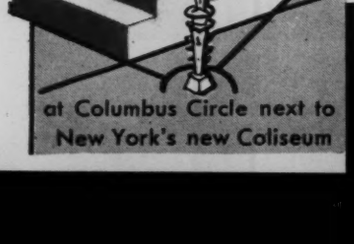
EDUCATIONAL: Harvard University, Rutgers University, Brown University, Wayne University, Kansas State Teachers College, Fund for Adult Education.

GOV'T & STATE AGENCIES: US Army, Ft. Leavenworth, Technical Photo Branch, Aberdeen Proving Ground, Cameron Station Quartermaster Activity, National Advisory Committee for Aeronautics, Dist. of Columbia Health Dept., Michigan State Dept. of Conservation.

AND MANY OTHERS . . . !

Miss Patricia McMahon of NATIONAL PRINT DEPOT, MODERN TALKING PICTURE SERVICE, Pittsburgh, Pa. . . . *"We have found the Dual Readers to be very efficient. The sound reproduction is far superior to that in any other equipment we have used in the past."*



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Dual Reader, less viewer **$195.00**
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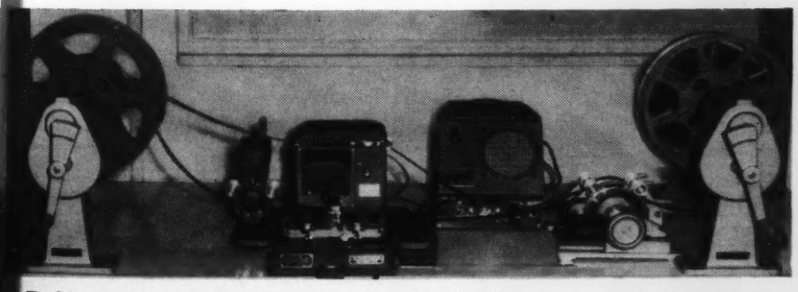

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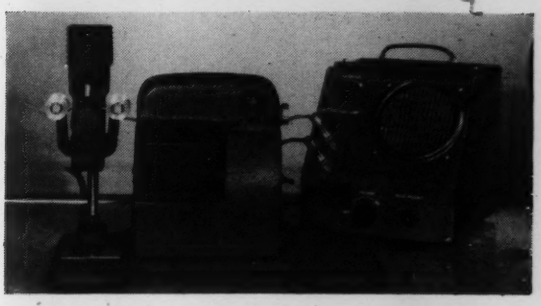
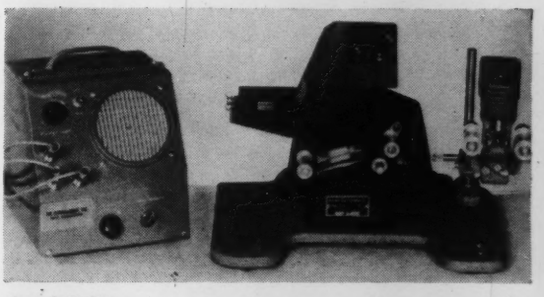


Dual Editor with Baia 16mm viewer list $227.00. **Special** **$189.50**



Dual Editor with Ace 35mm Rotary viewer (less image erector), list $439.50. **Special** **$395.00**

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Did your production run over the budget?

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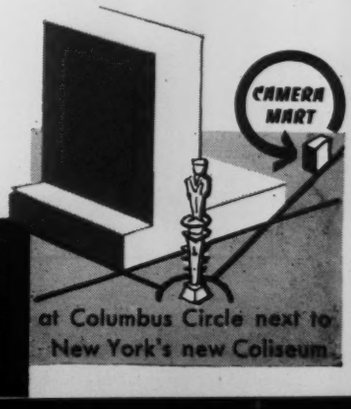
All prices F.O.B., New York. Subject to change without notice.



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BULLETIN BOARD

Continued from Page 72

graved gold plaques commemorati their respective achievements. Awar were made on the basis of a poll co ducted by *Limelight* among the N tion's top film critics.

Recipients of the 1960 Limeli Award for Best Cinematography we Robert L. Surtees, A.S.C., for "Be Hur," William C. Mellor, A.S.C., f "The Diary of Anne Frank," and Le Shamroy, A.S.C., for "Porgy an Bess."

"Ben-Hur," "Anatomy of a Murder and "Pillow Talk," were voted the Be Motion Pictures.

• • •

Film Daily, another motion picture i dustry trade paper, which has for se eral years made its Filmdom's Famou Fives awards at the close of each yea

PLANER MELLOR

last month announced the winners in wide range of categories, includin cinematography. As with the *Limeligh* awards, *Film Daily's* Famous Fives ar chosen on the basis of a poll among th nation's leading motion picture review ers, critics and radio and TV commen tators. Five achievements are single out in each category for which a scro is presented to the individual respons ble.

STRADLING BURKS

Honored for the Best Photographed Pictures of 1959, were: Franz Planer, A.S.C., for "The Nun's Story"; Harry Stradling, A.S.C., for "Aunt Mame"; Robert Burks, A.S.C., for "North By Northwest"; William Mellor for "The Diary of Anne Frank"; and Harry

Continued on Page 82

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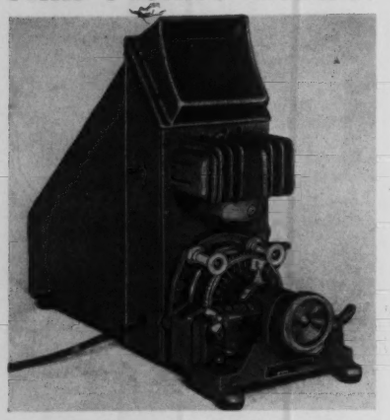

This advanced professional NCE 35mm Viewer combines the functions of viewer, synchronizer, footage counter and frame counter—all in one unit. Embodies many new advantages plus features found only in much higher priced units. Built-in precision optical shutter assures extra-smooth projection of running picture; or of single frame for frame-by-frame editing with a sharp, clear, brilliant picture 3¼" x 4¼". Picture can be stopped and viewed for periods of time without overheating or damage to film. Can be used with a sound reader for single system; available for additional 35mm or 16mm sprockets for double system film editing. Soundheads for magnetic tape can be added to additional sprockets for any number of magnetic tracks. Adapts easily as combination viewer/synchronizer, assembled to your specific needs.

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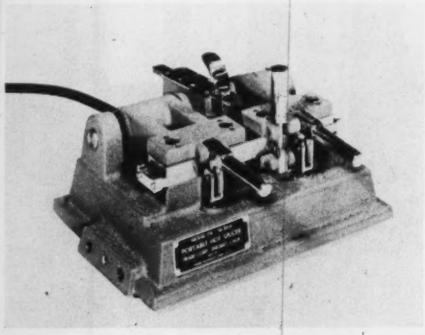
WHAT'S NEW

in equipment, accessories, services

Barney With Heater

Birns & Sawyer, 6424 Santa Monica Blvd., Hollywood 38, Calif., announce a line of electric heated barneys for motion picture cameras. Constructed similar to the conventional electric blanket with heater wires integrated with the sound-absorbing heat-retaining insulation material, the exterior covering is white DuPont Fabrilite. Heater unit feeds off 110-V AC current and has a 3-way control switch for varying heater temperature. Barneys may be altered for use with 24-volt and other low voltages on special order. Price ranges from $120.00 to $256.00, depending upon camera size.



Portable Hot Splicer

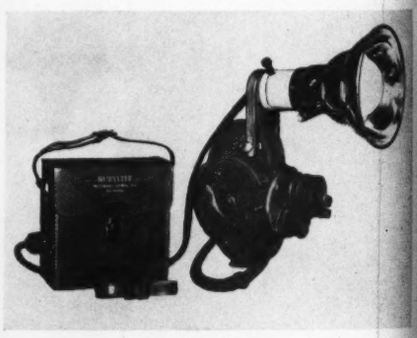
The well-known Maier-Hancock-designed portable hot splicers, formerly distributed by Bell & Howell Co., are now distributed exclusively by Traid Corp., Encino, Calif. Models are available for 35mm/16mm films and 16mm/8mm films. Equipped with precision, full-fitting pilot pins and lifetime carbide emulsion scraper, units splice and weld film in a single operation; A & B rolls may be spliced without turning films.

Sync Motor Drive

Cinekad Engineering Co., 763 Tenth Ave., New York 19, N. Y., announces a new synchronous motor drive adaptable to such portable 35mm projectors as Holmes, Simplex, DeVry, etc. Unit is quickly mounted or de-mounted, and no special tools or technical knowledge is required to complete the installation. Drives are available for either 110-v or 220-v 50 or 60 cycle current.

Acmade Editing Tables

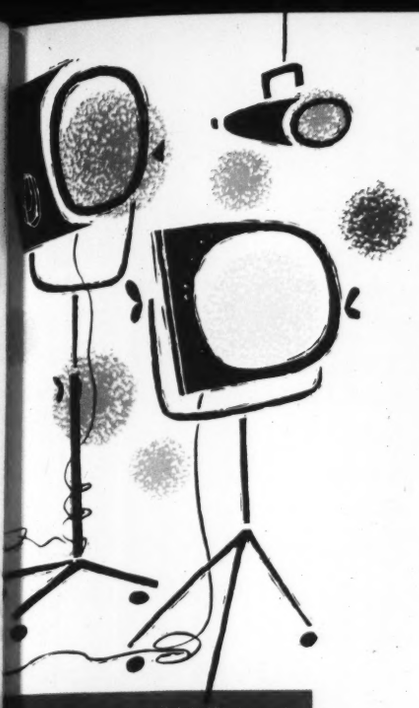
The Benjamin Berg Co., 1410 No. Van Ness Ave., Hollywood 28, Calif., announces it is exclusive U. S. distributor for the Acmade Mark II editing tables, product of the Rank Precision Industries, Ltd., London. Unit was specially designed to meet requirements of TV film editing, and boasts many exclusive features not found in any other similar equipment. An informative illustrated brochure may be had by writing the Benjamin Berg Co.



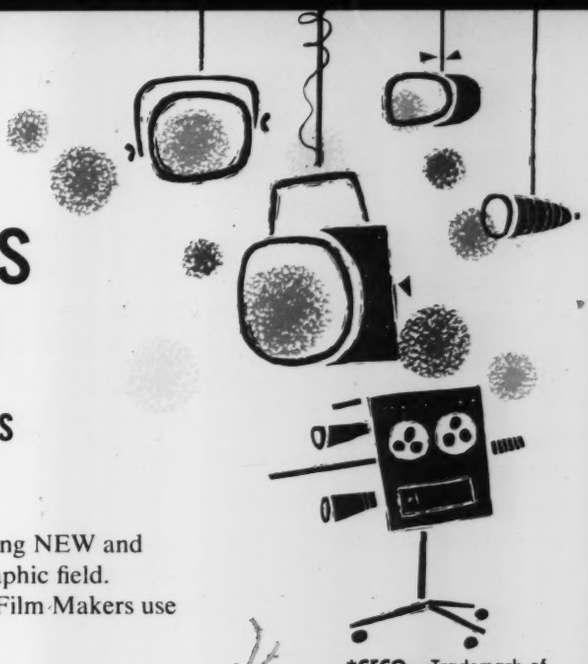
Portable Movie Light

The Rubylite is a sturdy, lightweight portable light unit designed for mounting on almost any hand-held motion picture camera such as the Eyemo, Filmo, etc. Coverage of lamp is equivalent to that of a 10mm lens; illumination has Kelvin temperature of 3400°; and affords exposure guide number of 35 with Tri-X or film of equal speed. Complete with nickel-cadmium rechargeable battery and weighing only 5 lbs., list price is $169.50.

Continued on Page 81



LIGHTS CAMERAS ACCESSORIES!



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- ☐ Colortran "Cine-King"
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- ☐ Kensol Hot Press
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Ideal for use *behind* the lights. Inexpensive. Uses regular flashlight batteries. A size for every need.

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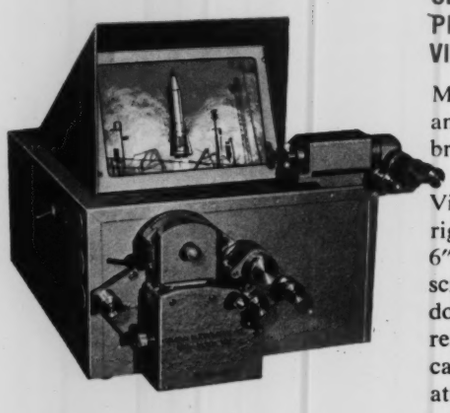
A versatile, inexpensive, bold marking instrument ready for immediate use on any surface. Unbreakable. Comes in many colors.



CECO 16mm PROFESSIONAL FILM VIEWER-ANALYZER

Makes film editing and analyzing a breeze. Easy threading, portable. Views film left to right on large 6″ x 4½″ brilliant screen. Single or double system sound reader and/or counter can be easily attached. 35mm models available.

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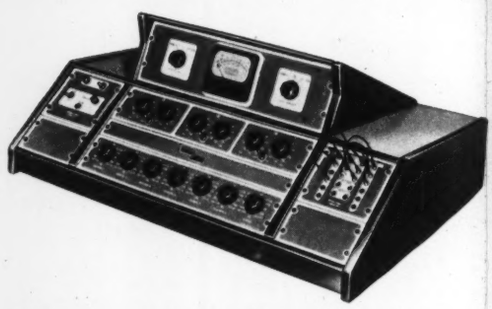


MAGNASYNC CONSOLETTE MODEL G-963

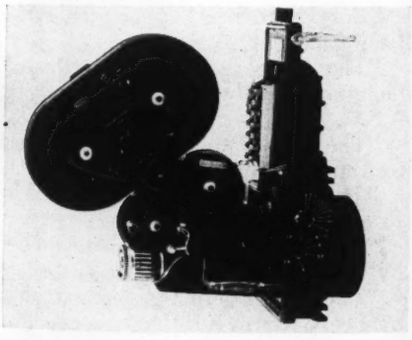
A miniaturized studio mixing console with 6 input channels and patch bay selection of three program equalizers. Optional plug-in microphone pre-amplifiers. Specifically designed for re-recording applications. Modular construction of cabinet and components.

WHAT'S NEW IN EQUIPMENT, ACCESSORIES, SERVICES

Continued from Page 78

Waddell Hi-Speed Cameras

Camera Equipment Co., 315 West 43rd St., New York 36, N. Y., is exclusive distributor for the Waddell 16mm High-speed motion picture cameras and accessory equipment. Available in a variety of models and motor combinations, the Waddell cameras afford speed ranges from 3 to 10,000 picture per second. Available is a 26-V DC motor and a 115-V AC-DC motor. Other features include electronic flash, variable height fixed aperture plate, two built-in timing lights, manual or remote control, boresight focusing, and film cut-off switch. Net weight is 35 lbs.



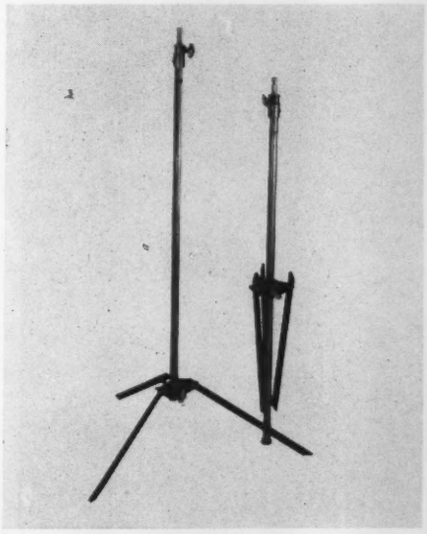
Underwater Housings

Underwater Sports, Inc., 2219 Biscayne Blvd., Miami 37, Fla., makers of underwater camera housings, announces a housing for the Arriflex 16mm and 35mm cameras (pictured with top removed). Of all metal construction, exterior controls are provided for all camera adjustments and a special optical system permits use of the Arriflex's reflex finder system. Other features include adjustment for neutral, positive or negative buoyancy; quick loading, and provision for self-contained battery for driving camera. Prices of complete housings range from $495.00 to $1,495.00.

Film Separator Strip

Uhler Cine Machine Co., 15762 Wyoming Ave., Detroit 38, Mich., offers a unique gadget for processing 16mm and 8mm film with stainless steel reels and developing tank. It consists of a plastic strip same width as 16mm film having elevated contact points along both edges. When wound with film on processing reels, separator strip provides space between windings of film that allows processing solutions to seep through and spread evenly over entire film surface.

Strips are available in 110-ft. 16mm lengths at $14.95, and 30-ft. 8mm lengths for $6.95.



Lightweight Pedestal

Illustrated above is the Type 3281 "Litewate" baby folding pedestal for mounting lamps for set-lighting, flags, scrims or other accessories. Manufacturer is Mole-Richardson Co., 937 N. Sycamore Ave., Hollywood 38, Calif. Unit is notable for its exceptionally-simple folding feature—legs lock anywhere on upright column. Of all-aluminum construction, it has a single extension affording a low position of 50-in., and a high of 81-in. Net weight is 3¾ lbs.

Free-to-Florida

Florman & Babb, New York, N. Y., announce a new "Free Freight to Florida" policy on all equipment rentals in that area. ■

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BULLETIN BOARD

Continued from Page 76

Waxman, B.S.C., for "Third Man On The Mountain."

• • •

The Academy of Motion Picture Arts And Sciences, last month, announced the motion picture productions of 1959 nominated for consideration for the Oscar awards for Best Achievement in Cinematography, as follows:

BLACK-&-WHITE

"The Young Philadelphians," photographed by Harry Stradling, A.S.C.

"Anatomy Of A Murder," photographed by Sam Leavitt, A.S.C.

"The Shaggy Dog," photographed by Edward Colman, A.S.C.

"Some Like It Hot," photographed by Charles B. Lang, Jr., A.S.C.

"The Last Angry Man," photographed by James Wong Howe, A.S.C.

"The Diary of Anne Frank," photographed by William Mellor, A.S.C.

"On The Beach," photographed by Guiseppe Rotunno.

"Compulsion," photographed by William Mellor, A.S.C.

"Career," photographed by Joseph LaShelle, A.S.C.

"The Gazebo," photographed by Paul Vogel, A.S.C.

COLOR

"Ben-Hur," photographed by Robert Surtees, A.S.C., Pietro Portalupi, A.S.C., and William Wellman, A.S.C.

"Journey to the Center of the Earth," photographed by Leo Tover, A.S.C.

"Porgy and Bess," photographed by Leon Shamroy, A.S.C.

"The Wreck of the Mary Deare," photographed by Joseph Ruttenberg, A.S.C.

"The Five Pennies," photographed by Daniel Fapp, A.S.C.

"The Nun's Story," photographed by Frank Planer, A.S.C.

"Operation Petticoat," photographed by Russell Harlan, A.S.C.

"The Big Fisherman," photographed by Lee Garmes, A.S.C.

"Rio Bravo," photographed by Russell Harlan, A.S.C.

"Li'l Abner," photographed by Daniel Fapp, A.S.C.

These are the nominees—the result of a preliminary balloting among the industry's cinematographers. Early this month, the cinematographers will vote to select five nominees in each classification — black-and-white and color — and a final vote by the entire Academy Membership at a later date will select the best photographed film in each classification. ■

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WALTER STRENGE'S

QUESTIONS & ANSWERS

Need advice on a picture making problem? Your questions are invited and will be answered by mail. Questions and answers considered of general interest will appear in this column each month.

Q I will appreciate your answers to the following questions: 1) Is there any difference in the quality of 16mm prints made from 35/32mm negatives compared to prints made from 16mm negatives? 2) Any difference in the quality of the sound track? 3) Where a 35/32mm negative currently in existence is slit into two 16mm negatives, will these negatives produce prints of poorer picture and sound quality than prints made from a 35/32mm negative? 4) Is there a noticeable difference betwen 16mm prints made from 35/32mm negatives and 16mm negatives that can be detected by the professional film technician?—*S.F.*

Answer: 1) The picture quality of prints made from 35/32mm negatives may not necessarily be better than those made from 16mm negatives; good prints can be made from both. However, 35/32mm negatives do have certain advantages due to the fact the picture image is located further from the edge of the film and therefore is less apt to receive developer-roller abrasion marks. Also, because the 35/32mm negative is wider and has more protection for the sprocket holes, it tends to be more dimensionally stable for printing purposes and normally will last longer for multiple release printing.

2) The sound quality would normally be better in 16mm prints made from a 35/32mm sound negative, due to the fact that the sound image is located at center of film and is not susceptible to developer or printer roller abrasions. This also results in improved signal-to-noise ratio.

3) Where the 35/32mm negative is properly slit, the resultant individual 16mm negatives should produce prints approaching the quality of those made in pairs from the 35/32mm negative —but may not be *equal* to them in quality because of the desirable features of the more dimensional stability of the wider film, as explained above.

4) The difference, if any, between prints made from 35/32mm negatives and 16mm negatives could be detected by a professional film technician. This is particularly true of sound quality.

Q How were the fluorescent lighting tubes hooked up to produce the lighting effects for some of the interiors for "Diary of Anne Frank?" —*W. J. McD.*

Answer: The lamps you refer to were not fluorescents but G-E 60-watt lumeline tubes controlled by a Variac (heavy-duty rheostat).

Q Can 16mm movie film be reproduced on 35mm movie film? If so, white is the cost?—*B.B.*

Answer: Yes, almost any of the major film laboratories can "blowup" (enlarge) 16mm film to 35mm. For prices, etc., write to any of the laboratories whose advertisements you will find regularly in each issue of this publication.

Q I am interested in shooting a picture in 16mm, using the Bolex anamorphic lens on my camera, the aspect ratio of which is 2-to-1. I plan to have this footage blown-up to 35mm for exhibition in theatres in the Cinemascope 2.66-to-1 format. Because of the difference in aspect ratios of the 16mm and 35mm lenses, will this prove a problem when it comes time to project my picture?—*R.A.A.*

Answer: For satisfactory results, the aspect ratio of the anamorphic taking lens and the anamorphic projection lens should be identical. If you project a film shot in the 2-to-1 aspect ratio through a CinemaScope type projection lens having an aspect ratio of 2.66-to-1, there will be some lateral distortion in the screened result.

Q For a film I am making dealing with the ocean, I wish to make titles in the sand, with waves washing one title away and the title followed by another. How can I do this?—*Y.Y.*

Answer: Make a wooden box about 3 by 6 feet in size and 8-inches deep and fill it half-full of sand. Tilt the box so that when the sand is leveled it is even with the top of the lower edge of the box.

Next, provide a tub of water and

Continued on Page 86

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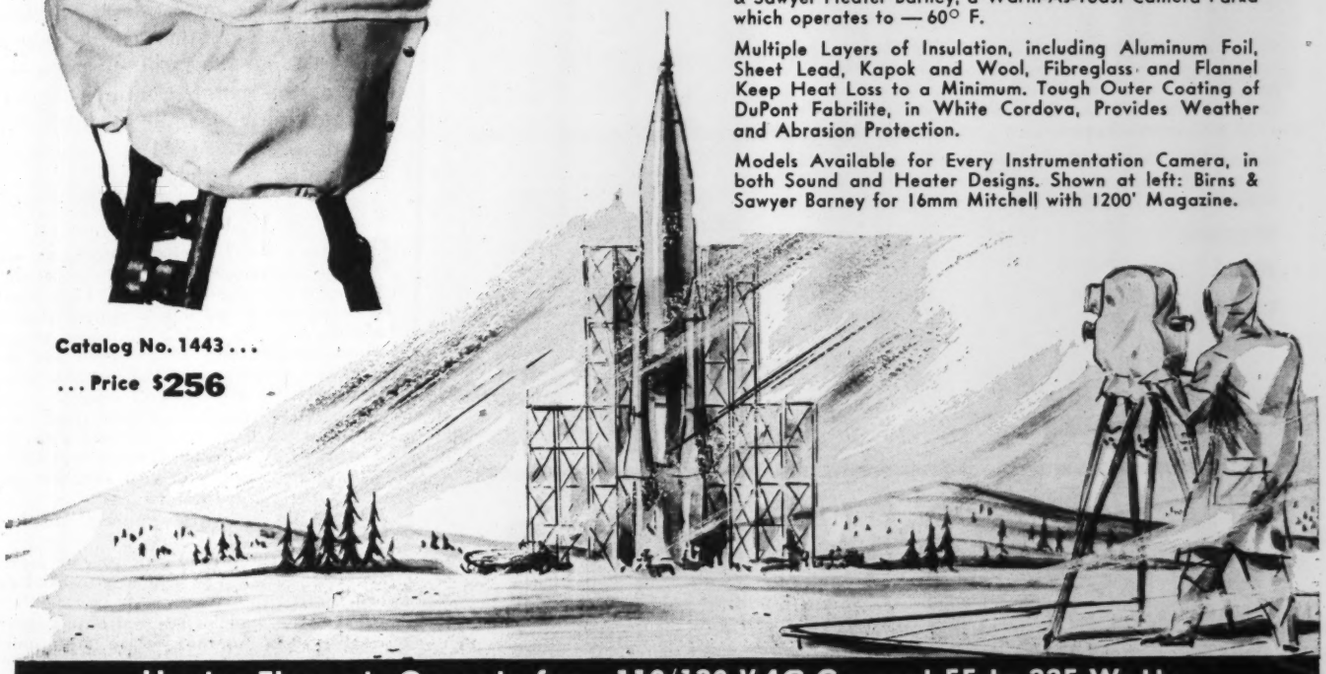

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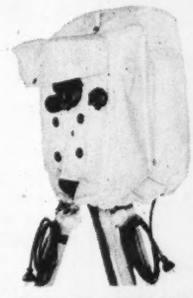

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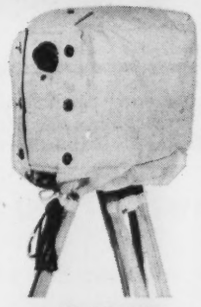

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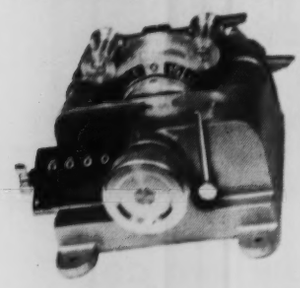

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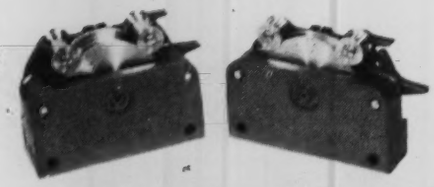

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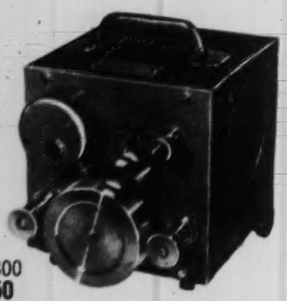

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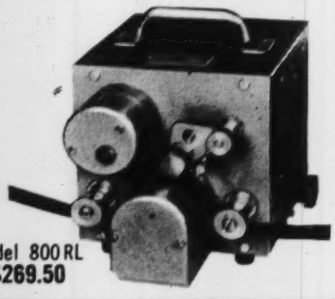

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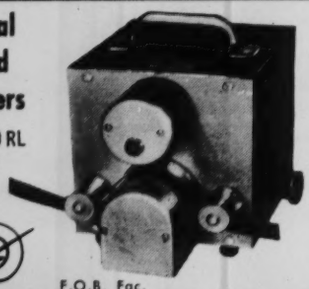

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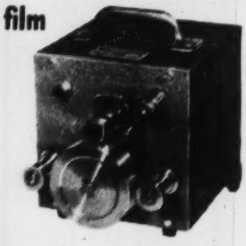

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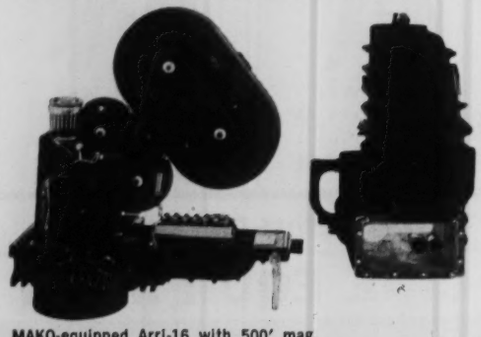

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QUESTIONS & ANSWERS

Continued from Page 84

place it near the box, where an assistant can pour its contents into the box at the elevated side.

With your camera lined up on the sand box (but without the box itself visible in the finder, of course) write the first title in the sand. Start camera by fading in; read the title as you shoot to determine the required screen time, then have the sand flooded with water to obliterate the title—at the same time you fade out on the title.

Next, wind back film in the camera; write the next title in the sand and fade in on same as you start to shoot again. This will create a dissolve at this point. Continue shooting for the desired reading time, then repeat the procedure for as many subsequent titles as you may require.

Q I am a British cinematographer and am impressed with the fine quality of the photography of the "Thin Man" TV film series, which is transmitted in London by the BBC. In view of the known limitations of telecine and the television system, I would be most interested in knowing the following:

1) What was the film stock and f/stop used for this series, also the amount of illumination in foot-candles?

2) What was subject contrast and print contrast ratios?

3) What was the general color of the sets?

4) Was the key light, arc or incandescent? What was the key-to-fill light ratio?

5) Peter Lawford's makeup appears heavier than normal. If so, how much heavier?—*M.S.*

Answer: 1) Eastman Plus-X, Type B, at f/3.2 at 150 foot-candles. 2) 2-to-1 and 3-to-1. 3) Neutral beige. 4) Incandescent; ratio 3-to-1. 5) Characteristic of the actor's reflective qualities.

Q In making butt splices with tape, can the tape be easily and completely removed in event the film is to be respliced at the same point?—*W.L.I.*

Answer: Yes.

Q When using mattes or masks before the lens for split-stage and other effects, how does one calculate the distance to set the mattes from the lens?—*R.E.W.*

Answer: There is no set formula for this operation for the reason that one type split-screen shot may call for a soft blend at the matte edge (or where

Continued on Page 122

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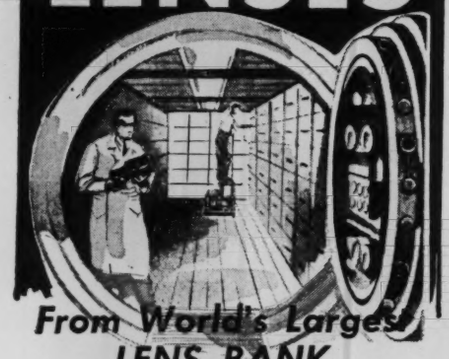

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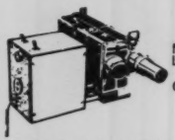

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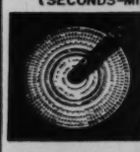

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WHAT THE INDUSTRY'S CAMERAMEN WERE SHOOTING LAST MONTH

By MARION HUTCHINS

CHARLES LANG'S crew lines up camera for closeup of Kim Novak for Columbia Picture's "Strangers When We Meet."

ALLIED ARTISTS

LUCIEN BALLARD, ASC, "Pay or Die" with Ernest Borgnine and Zohra Lampert. Richard Wilson, director.

ELLIS CARTER, ASC, "Sexpot Goes to College" (Shooting at Hal Roach; Photoplay Assoc.) with Mamie Van Doren and Tuesday Weld. Albert Zugsmith, director.

AMCO STUDIOS

ARCHIE DALZELL, "The Passionate People Eater" (The Filmgroup) with Dick Miller and Jackie Joseph. Roger Corman, director.

AMERICAN NATIONAL

JACK MARQUETTE, "Bat Masterson"* (Ziv-TV) with Gene Barry.

RICHARD RAWLINGS, "The Man and the Challenge"* (Ziv-TV) with George Nader.

MONROE ASKINS, "This Man Dawson"* (Ziv-TV) with Keith Andes.

MONROE ASKINS, JACK MARQUETTE, "Lock-up"* (Ziv-TV) with Macdonald Carey.

CURT FETTERS, "Tombstone Territory"* (Ziv-TV) with Pat Conway.

JACK MARQUETTE, RICHARD RAWLINGS, "Sea Hunt"* (Ziv-TV) with Lloyd Bridges.

WILLIAM WHITLEY, ASC, "Men Into Space"* (Ziv-TV) with Bill Lundigan.

CALIFORNIA STUDIOS

STUART THOMPSON, ASC, "Have Gun, Will Travel"* with Richard Boone and Kam Tong.

FLEET SOUTHCOTT, "Gunsmoke"* with James Arness and Dennis Weaver.

FRED BENTLEY, "The Lineup"* with Warner Anderson and Tom Tully.

CASCADE PICTURES

ELWOOD BREDELL, ASC, Commercials*

WILLIAM SKALL, ASC, Commercials*

COLUMBIA

IRVING LIPPMAN, "Manhunt"* (Screen Gems) with Victor Jory and Patrick McVey. Fred Jackman, director.

CHARLES WELBORN, "Tightrope"* (Screen Gems) with Michael Connors.

GERT ANDERSEN, ASC, "Donna Reed Show"* (Screen Gems) with Donna Reed. Oscar Rudolph, director.

FRED GATELY, ASC, "Father Knows Best"* (Screen Gems) with Robert Young and Jane Wyatt. Peter Tewksbury, director.

PHILIP TANNURA, ASC, "Man from Blackhawk"* (Screen Gems) with Robert Rockwell.

WILKIE COOPER, "I Aim at the Stars" (Morningside Prods.; shooting in Germany) with Curt Jurgens and Gia Scala. Lee Thompson, director.

DANIEL FAPP, ASC, "All the Young Men" (Hall Barlett Prods.) with Alan Ladd and Sidney Poitier. Hall Bartlett, director.

CHRIS CHALLIS, "Surprise Package" (Stanley Donen Prods.; shooting in Europe) with Yul Brynner and Mitzi Gaynor.

CHARLES LANG, ASC, "Strangers when we Meet" (C'Scope & Color; Richard Quine Prods.) with Kirk Douglas and Kim Novak. Richard Quine, director.

BURNETT GUFFEY, ASC, "Reach for Tomorrow" with Burl Ives, Shelley Winters and James Darren. Philip Leacock, director.

JOSEPH BIROC, ASC, '13 Ghosts" (William Castle Prod.) with Joe Morrow. William Castle, director.

HENRY FREULICH, ASC, "Alcoa-Goodyear Theatre"* (Screen Gems) Don Taylor, director.

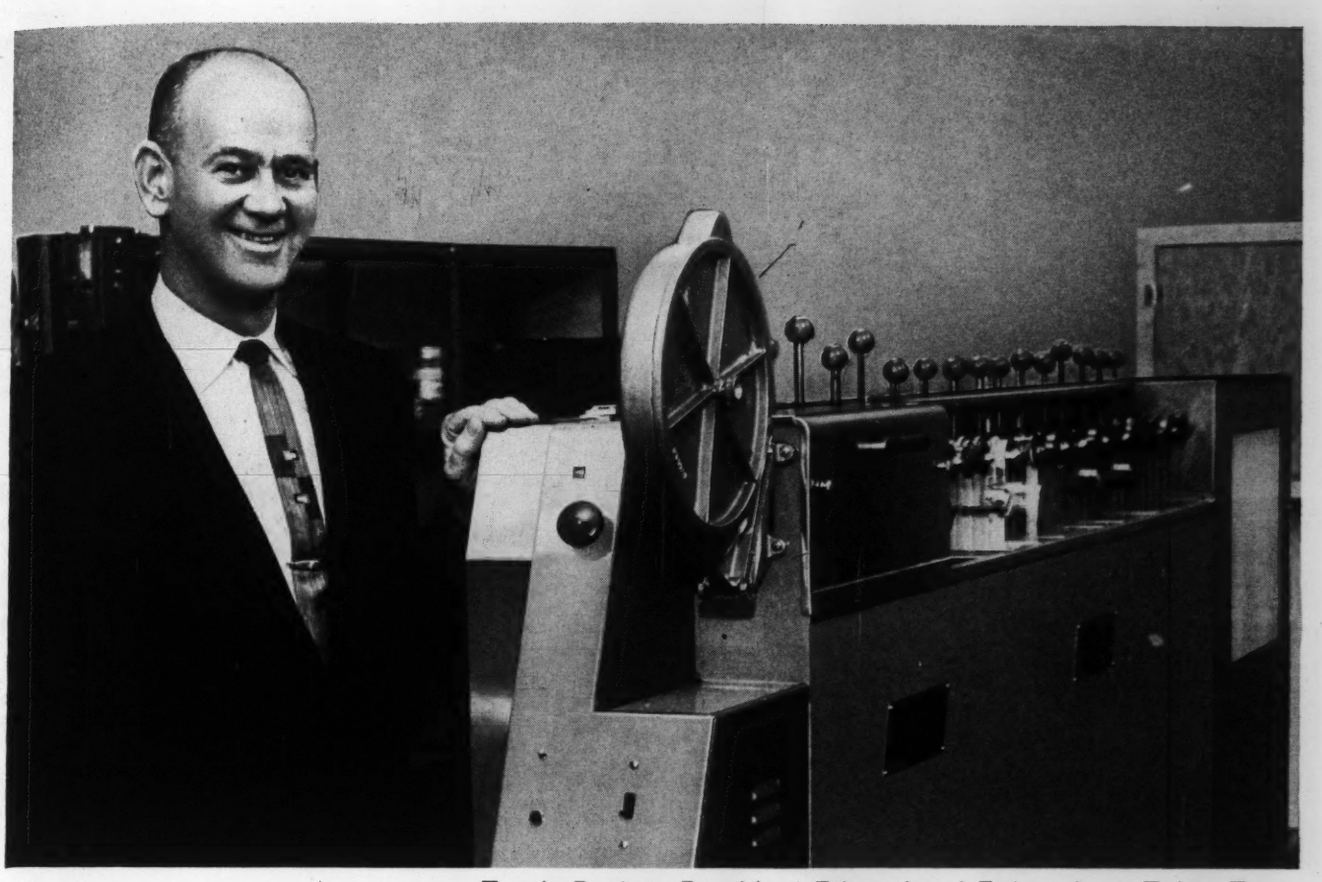
IT WAS really cold at St. Mary, Montana, when Dan Fapp and his camera crew shot this scene for Columbia's "All The Young Men."

DESILU STUDIOS—Culver City

LUCIEN ANDRIOT, ASC, "U. S. Marshall"* (Desilu Prods.) with John Bromfield.

CHARLES BURKE, "Man with a Camera"* (Desilu Prods.) with Charles Bronson.

Continued on Page 90



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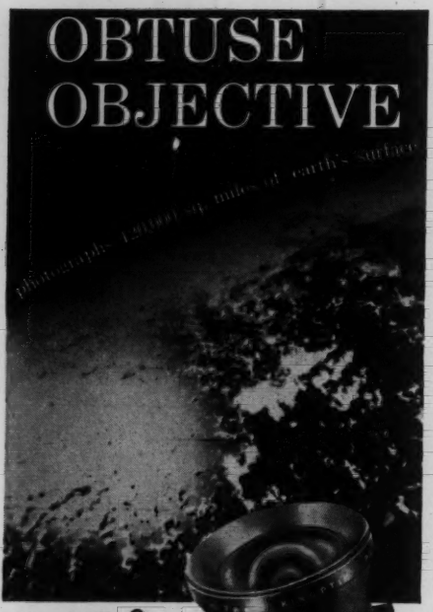

113°
SUPER-
WIDE ANGLE
COVERAGE

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PHOTOGRAPHIC ASSIGNMENTS

Continued from Page 88

CHARLES VAN ENGER, ASC, "Betty Hutton Show"* (Desilu Prods.) with Betty Hutton. Richard Kinon, director.

HENRY CRONJAGER, "Grand Jury"* (Desilu Prods.) with Lyle Bettger and Harold Stone. Sobey Martin, director.

EDWARD FITZGERALD, ASC, "The Gale Storm Show"* (ITC Prods.) with Gale Storm and ZaSu Pitts. James Kern, director.

HARKNESS SMITH, "Pony Express"* (Desilu Prods.) Jean Yarborough, director.

DESILU STUDIOS—Gower

KENNETH PEACH, ASC, "Lassie"* (Jack Wrather Prods.) with June Lockhart and John Provost.

ROBERT PLANCK, ASC, "The Millionaire"*. James Sheldon, director.

PAUL IVANO, "The Texan"* (Desilu Prods.) with Rory Calhoun.

CHARLES STRAUMER, "The Untouchables"* (Desilu Prods.) with Robert Stack and Jerry Paris.

ROBERT PITTACK, ASC, "Ann Sothern Show*" (Desilu Prods.) with Ann Sothern.

SID HICKOK, ASC, "Lucille Ball & Desi Arnaz Show"* (Desilu Prods.) with Lucille Ball & Desi Arnaz. Jerry Thorpe, director.

DESILU STUDIOS—Hollywood

ROBERT DE GRASSE, ASC, "Danny Thomas Show"* (Desilu Prods.) with Danny Thomas, Sheldon Leonard, director.

LOTHROP WORTH, ASC, "The Real McCoy's"* (Brennan-Westgate Prods.) with Walter Brennan. Hy Averback, director.

DISNEY STUDIOS

HARRY WAXMAN, "The Swiss Family Robinson" (Panavision & Tech.; Buena Vista release; shooting in B. W. I.) with John Mills and Dorothy McGuire. Ken Annakin, director.

FOX WESTERN AVENUE

JAMES VAN TREES, ASC, "The Many Loves of Dobie Gillis"* with Dwayne Hickman. Rod Amateau, director.

ERNEST HALLER, ASC, "The Boy and the Pirates" (Eastman color; U.A. release) with Susan Gordon and Charles Herbert. Bert I. Gordon, director.

GENERAL SERVICE STUDIOS

HAROLD LIPSTEIN, ASC, "Adventures of Ozzie & Harriet"* (Stage 5 Prods.) with Ozzie, Harriet, David and Rickey Nelson. Ozzie Nelson, director.

FRANK REDMAN, ASC, "Perry Mason"* (CBS-TV) with Raymond Burr and Barbara Hale.

MEREDITH NICHOLSON, "Border Patrol"* (Gallu Prods.) with Richard Webb. John Peyser, director.

HARRY WOLF, "Hennessey"* (Hennessy Prods.) with Jackie Cooper.

THOMAS TUTWILER, ASC, Commercials* (Filmways Prods.)

MAURY GERTSMAN, ASC, Commercials* (Filmways Prods.)

BORIS KAUFMAN lines up shot for "The Fugitive Kind," starring Marlon Brando, on up-state New York location.

GOLDWYN STUDIOS

NORBERT BRODINE, ASC, EUGENE POLITO, "Loretta Young Show"* (Lewislor Prods.) with Loretta Young.

INDEPENDENT

JOHN ALTON, "Elmer Gantry" (Eastman color; Elmer Gantry Prod. for UA release) with Burt Lancaster and Jean Simmons. Richard Brooks, director.

ERNEST LASZLO, ASC, "Inherit the Wind" (Stanley Kramer Prods. for U.A. release) with Spencer Tracy and Florence Eldridge. Stanley Kramer, director.

JOSEPH LASHELLE, ASC, "The Apartment" (Mirisch Co. for UA; shooting in N.Y.) with Jack Lemmon and Shirley MacLaine. Billy Wilder, director.

ERNEST HALLER, ASC, "Girl on Death Row" (Panavision; American Int'l Picts.) with Terry Moore and Lionel Ames. Roy Del Ruth, director.

FLOYD CROSBY, ASC, 'Fall of the House of Usher" (American Int'l Picts.) with Vincent Price and Mark Damon.

KEYWEST STUDIOS

WALTER STRENGE, ASC, Series of regligious films* (Family Films). Edward Dew, director.

METRO-GOLDWYN-MAYER

DALE DEVERMAN, "One Step Beyond"* with John Newland.

WILLIAM MARGULIES, "Not for Hire"* (Calif. National Prods.) with Ralph Meeker; "Philip Marlow"* (Jack Chertok Prods.) with Phil Carey.

WILLIAM SPENCER, "Fibber McGee and Molly"* (NBC-TV) with Bob Sweeney and Cathy Lewis.

MILTON KRASNER, ASC, "Bells are Ringing" (C'Scope & Metrocolor; Arthur Freed Prod.) with Judy Holliday and Dean Martin. Vincente Minnelli, director.

PHILIP LATHROP, "Peter Gunn"* (Spartan Prods.) with Craig Stevens and Lola Albright; "Mr. Lucky"* (CBS-TV).

GIUPPE ROTUNNO, "Temptation" (Titanus Prod.; shooting in Sicily with Ava Gardner and Dirk Bogarde. Nunnally Johnson, director.

JOHN NICHOLAUS, "Rawhide"* (CBS-TV) with Eric Fleming and Clint Eastwood.

WILLIAM DANIELS, ASC, "All the Fine Young Cannibals" with Robert Wagner and Natalie Wood. Michael Anderson, director.

Continued on Page 121

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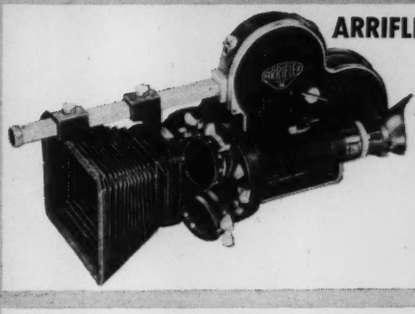

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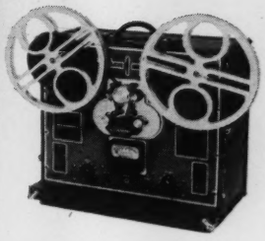

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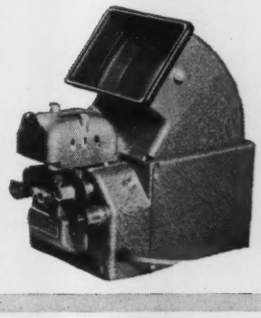

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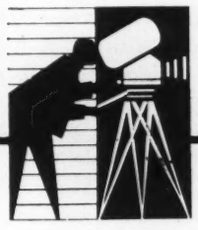

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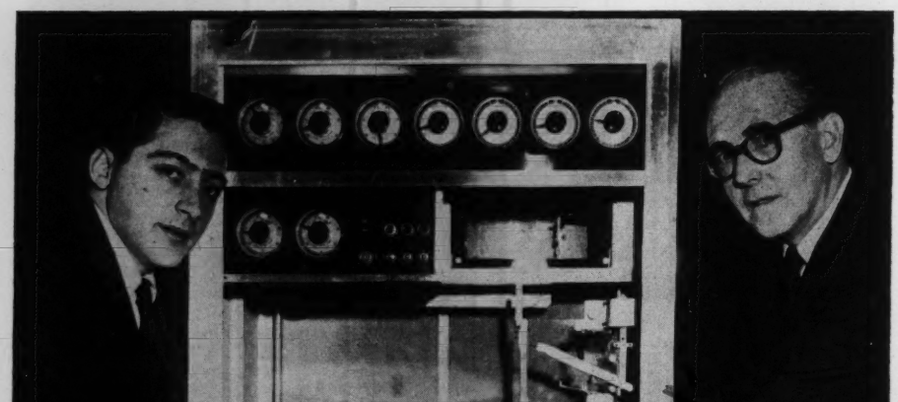

THE BRAINS OF SMELL-O-VISION—Michael Todd, Jr. (left) sits beside master control and scent energizer of the Smell-O-Vision system with its inventor Hans Lube. Latter points to the multitude of vials each containing a different scent which is selectively projected through tubes to every seat in theatre on signal triggered from picture's sound track.

This Movie Has Scents!

It smells, but pleasantly! You'll be intrigued by this innovation in motion picture presentation—scented scenes that can be smelled as well as seen.

By HERB A. LIGHTMAN

"SCENT OF MYSTERY," Michael Todd, Jr.'s feature film production in what is advertised as "Glorious Smell-O-Vision" is, from the audience's viewpoint, great fun. Considered from the technical aspect, it represents a significant achievement in the fields of color cinematography, color printing, sound recording and—of course—the projection of a series of odors precisely synchronized to and complementing the action of the film.

The scent element is undeniably the magnetic attraction which has drawn audiences to see the picture in Chicago and Los Angeles, the two cities in which it has been released thus far.

However, even without its olfactory gimmick the film would be notable for its magnificent color photography, accomplished by means of the newly developed 70mm Todd Process Camera; also for its spectacular 8-channel Todd-Belock sound system, which covers a 360-degree area and provides the widest frequency range ever reproduced in a theater.

"Scent of Mystery" is a knock-down-drag-out chase, adventure, who's-gonna-do-it? mystery-travelogue done in the Hitchcock manner—but not by Hitchcock. During the course of its two-hour-plus running time, everybody chases everybody else over some of the most beautiful Spanish scenery ever captured on color film. There is comedy and suspense aplenty and—as if that weren't enough—30 different odors including that of roses, peach, woodshavings, baking bread, bananas, boot polish, pipe tobacco, perfume, salty ocean breeze, oil paint, wine, sugar cane, garlic, gun smoke, clover, coffee, brandy, peppermint lavender, carnation, fresh air, train smoke and incense.

By means of a complex mechanical set-up these odors are individually projected to each separate seat in the theatre at the precise split-second when olfactions are vital to the plot and serve as clues in solving the mystery.

Criticized in some quarters for changing the original name of the process, "Scentovision," to the less-dignified appellation, "Smell-O-Vision," producer Todd muses: "I don't understand how you can be dignified about a process that introuces smells into a theatre. To my mind you are being pretentious if, to paraphrase Shakespeare a bit, you call a smell by any other name. To go one step further, it's difficult, if not impossible, to have fun when you are being pretentious. Thus we called the process Smell-O-Vision to indicate that we think of it as a fun device."

The idea of coupling odors with theatrical presentations is not entirely new. More than twenty years ago orange blossom extract was sprayed on unsuspecting audiences during the unfolding of climactic wedding sequences in several pictures and in one or two Broadway stage productions.

Prof. Hans Laube, inventor of the Smell-O-Vision process, is a world-famed osmologist who was formerly a successful advertising executive in Zurich, Switzerland. He had invented a method for clearing the air in large auditoriums and soon had a lucrative business that served all Europe. One day it occurred to him that if he could take odors *out* of the air he could also put them *into* the air.

He got his chance to try out his idea when the Swiss government sent him to the New York World's Fair to exhibit a film accompanied by several different odors. At the same time, a number of companies then pioneering in American television asked Laube to work with them toward combining smell-action with television. However, this process proved to be far too complicated to be practical and the idea was abandoned.

In 1954 producer Michael Todd and his son, Michael, Jr., first witnessed

a process designed to project odors synchronized with action on film. Subsequently, the Todd Company spent several years and considerable money testing various methods of wafting odors to a theatre audience. In 1958, convinced that Prof. Laube had the best process, Todd, Jr. signed a contract with the inventor's corporation, Scentovision, Inc. Todd set up a laboratory for Laube and gave him full use of the refurbished 1100-seat Todd Cinestage Theatre in Chicago as a full-scale testing ground for the system.

Thet heart of the process is an electrically-controlled dispensing machine which acts as the "smell-brain." Made of stainless steel, specially treated rubber, and glass, it looks like something out of an Atomic plant. Installed in the depths of the theatre, this mechanical monster is equipped with a series of metal vials containing essences of every aroma to be projected during the run of the film. It also has a central panel with a bank of dials for regulating the concentration of odors.

The machine begins to operate as soon as the projectionist starts the 70mm picture print running through the projector. A precisely synchronized separate track cued with electronic signals for each odor triggers the smell mechanism and the almost-human machine moves into action selecting in order and dispensing over 30 different scents from the circular tray of vials.

"Each vial," explains Laube, "contains 400 c.c. of highly-concentrated essence of a specific scent. An electrical impulse set off by a cue from the specially synchronized track releases about 2 c.c. of the essence into a blower which 'amplifies' the scent and forces it under low pressure to the individual outlets installed at each seat. Two c.c. of the essence is sufficent to reach 1,000 seats simultaneously—which means that a single filling of the vials is sufficient for 180 performances. Each scent persists for a different length of time depending upon the demands of the pictorial sequence, and this, too, is regulated by the electronic cue track. The machine is completely automatic and does not require the attention of an operator during a screening of the picture."

What sets the Smell-O-Vision process apart from a competitive process is that it does not depend upon any such hap-hazard method as flooding the theater with odors through the ventilating system. It's unique advancement is its ability to deliver on cue *to each individual seat in the theatre* a small quantity of scent-impregnated air as called for in the script. Thus, each member of the audience receives his own private whiff at the same instant and in perfect synchronization with the film.

This mechanical magic is accomplished by means of a mile of plastic pipe (ranging from ½ inch to 1 inch in diameter) which conducts the scented air from the central blower to outlets at each seat. These outlets are unobtrusive dull-black perforated cylinders, about ¾ inch in diameter and 18 inches long, mounted securely between

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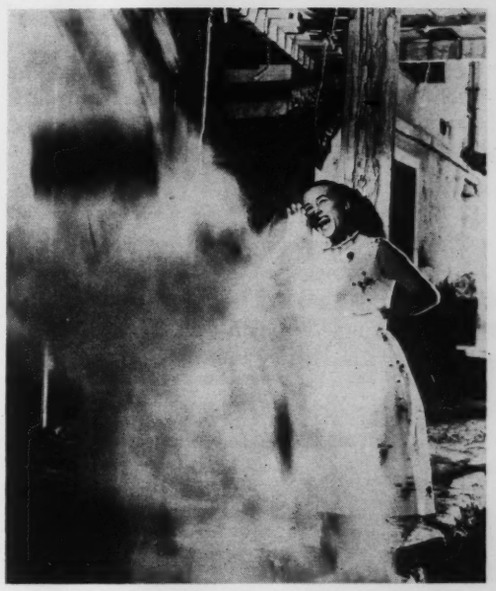
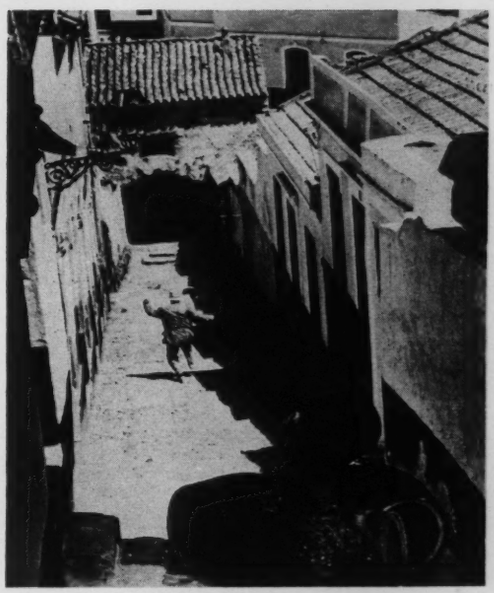
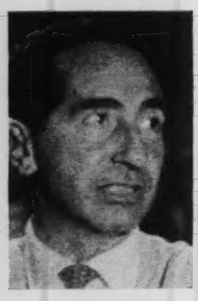




BESIDES ITS AROMATIC INNOVATION, "Scent of Mystery" boasts sensatonal action scenes, some of which are pictured at right. In top photo the hero makes daring slide for life down cable to which he has hooked his umbrella handle. In center photo, Beverly Bently just misses death as villain releases load of rubble upon her from overhead. In lower photo Liam Redmond runs to escape several rumbling casks of wine unleashed by villain. When they crash, pungent aroma of wine is smelled by audience.

ANDREW MARTON
. . . directed it



PIETRO PORTALUPI
. . . filmed it

FILMING THE CHARIO

The man who directed the most thrilling sequence in MGM's great epic describes the many problems encountered in photographing it.

THE ARTICLE *beginning on this page is a fitting sequel to Libero Grandi's story "The Photography of 'Ben-Hur'," which appeared in our October issue. It describes in excellent detail the problems that were encountered in staging and photographing what is considered the most thrilling motion picture action sequence of all time. It is reprinted here by permission of* FILMS IN REVIEW, *for whose January, 1960, issue it was written by Director Andrew Marton.*
—EDITOR.

THE LATE SAM ZIMBALIST was a close and respected friend and when he asked me to stage and direct the chariot race sequence for *Ben-Hur* I had mixed feeling. It was a challenge, but it also meant anonymity, in accordance with the motion picture industry's archaic rules for screen credits.

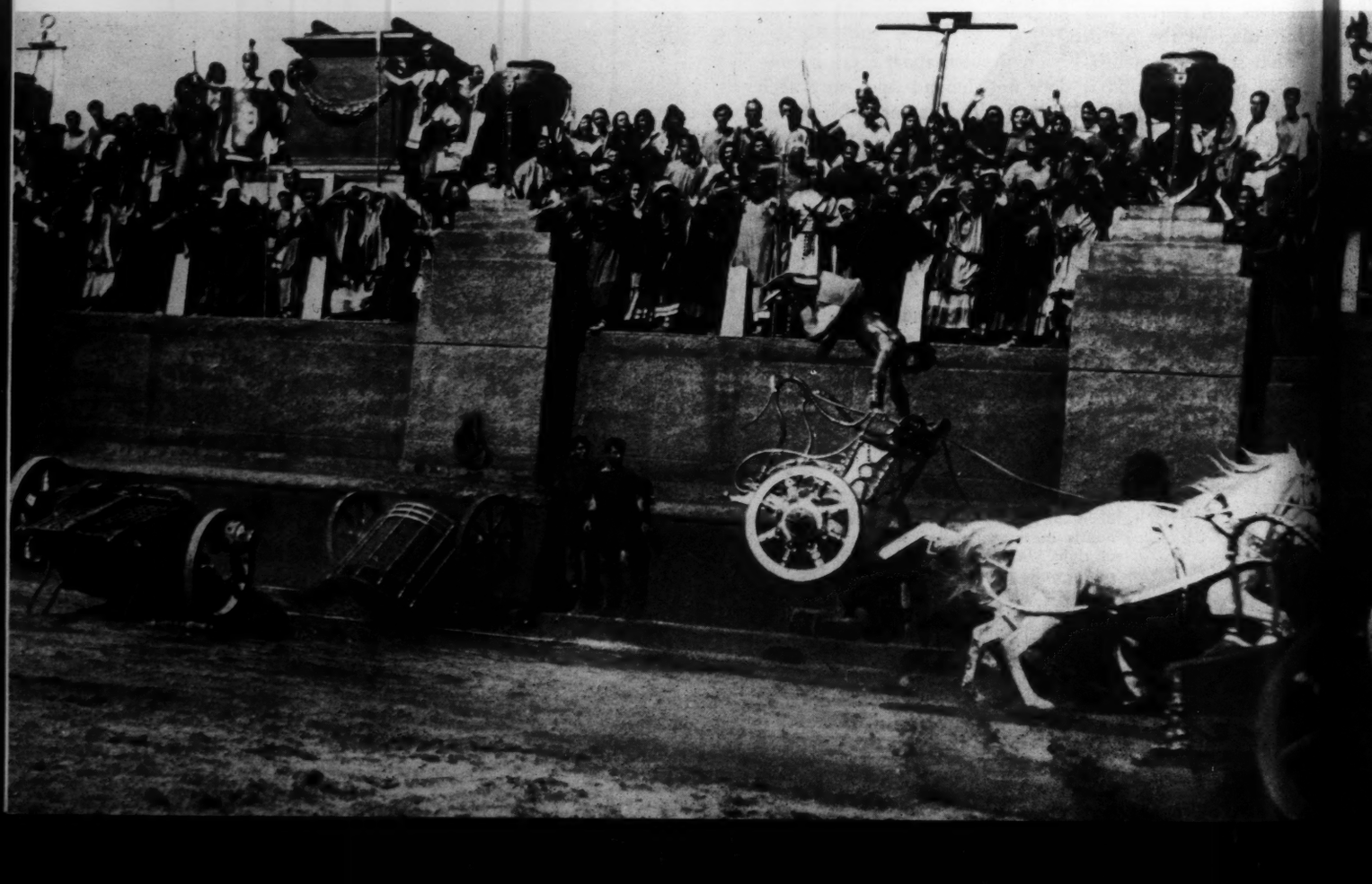
I had been disappointed before. I directed the mountain battle scenes in David O. Selznick's *A Farewell to Arms* and was "lavishly" rewarded with a screen credit which read in effect: "Many thanks to Andrew Marton for his valuable contribution." What contribution? Audiences never knew.

However, the challenge of *Ben-Hur's* chariot race was there. Zimbalist was there. And William Wyler, whom I respect greatly, was there. I had directed a sequence for Wyler before—the so-called "Dunkirk" sequence in *Mrs. Miniver*.

So I said: "Let's go."

Zimbalist gave me carte blanche, except for one warning. It was not to be just a race, but a race to the death that carried the implacable hatred of Ben-Hur (Charlton Heston) and Messala (Stephen Boyd) to its logical conclusion. The problem was not who wins the race, but who stays alive. In other words, Zimbalist wanted the most exciting and dan-

STUNT MAN Joe Canutt, who doubled for Charlton Heston (Ben-Hur) in this scene, took it too fast . . .



RIOACE FOR "BEN-HUR"

By ANDREW MARTON

gerous race ever—BUT. His one warning: if anything happened to Heston or Boyd there would be no picture.

MGM started building the arena for the race in January '58 at the Cinecitta Studios in Rome. Since the arena in the story is in Jerusalem, its architecture was not Roman, but more barbaric and primitive. Only this one arena was needed, since the film does not show how Ben-Hur, during his stay in Rome, got to be an expert charioteer. We do see him near Jerusalem criticizing the training of some Arabian horses intended for the race. But the first time we see him in a chariot is when he enters the arena for the race.

While this huge set was being built we hunted for suitable horses—and matching teams, which were essential. The race was to be run by nine chariots drawn by four horses each, but since certain teams had to be duplicated, and there had to be "understudy" teams for the "star" teams, we required 82 horses of the proper physique, and harmonious colors. Horses can go lame, and anything can happen in a race.

The horses were finally obtained in Yugoslavia and in late January we began active preparations for the filming of the race. Actual shooting was to be in May and June.

In order not to interfere with the building of the arena, an identical track was built adjoining it so we could start training the horses and chariot riders, and lay out camera shots.

The surfacing of the race track proved to be a troublesome problem. Research in Roman libraries turned up nothing on the composition of the surfacing of the race tracks of two millenia ago. The surface of our track had to be hard enough to hold the careening chariots and horses, had to have a drainage system in case of rain, and had to have a sanded top, because cement would lame the horses.

So we started with ground rock debris, which had to be steam-rolled. That was covered with 10 inches of ground lava—against my and Yakima Canutt's judgment—and *that* was covered with 8 inches of crushed yellow rock.

This lasted only one day when actual shooting began. It was used only in the first long shots, in which there were

Continued on Page 112

. . . and achieved a stunt that is the highlight of the chariot race.

THE ONE-STOP S

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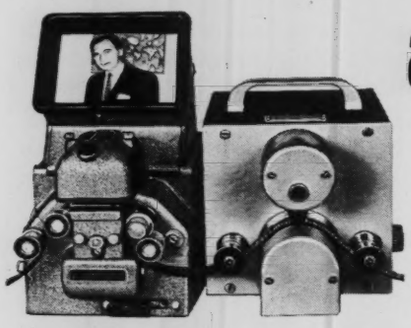

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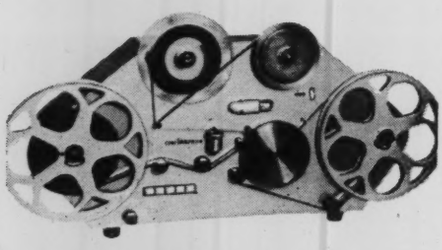

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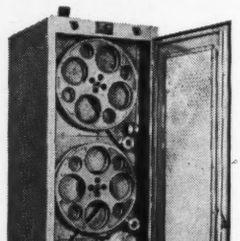

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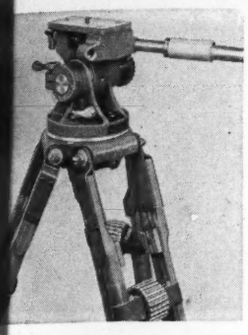

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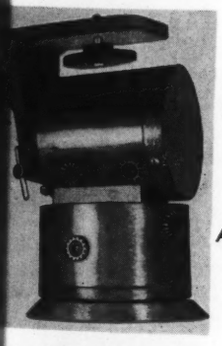

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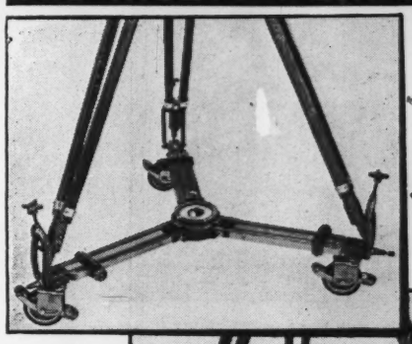

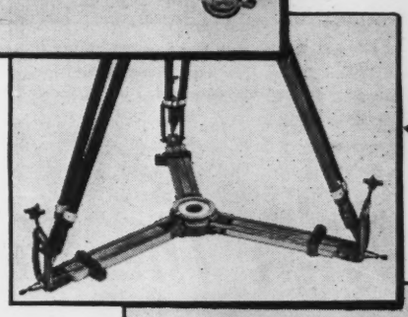

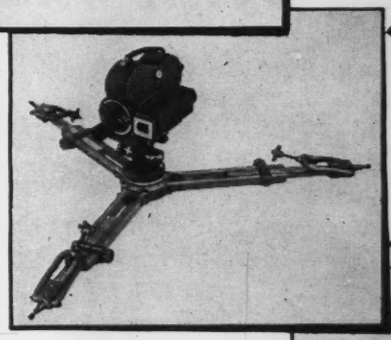

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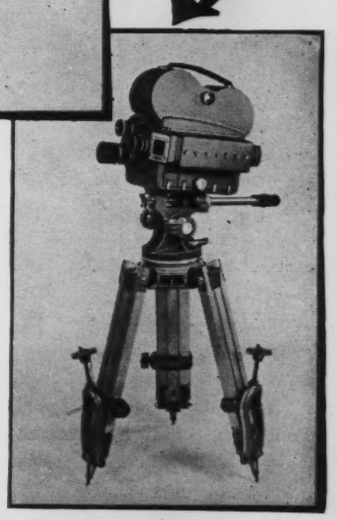

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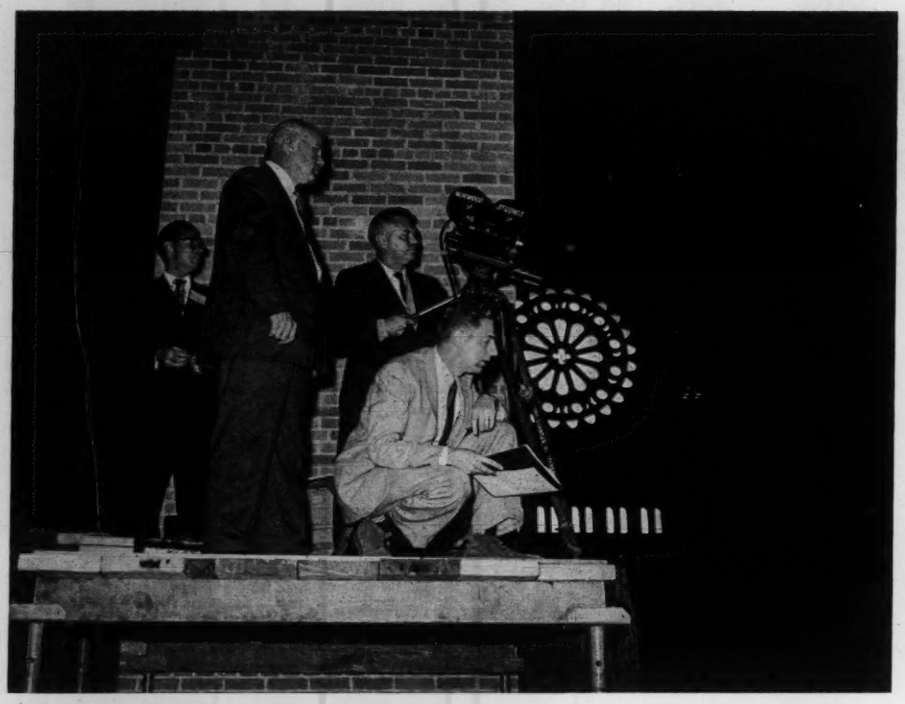


CAMERA SET-UP for filming interiors for "Our Lady's Shrine." Behind camera is director of photography Glenn Johnston. Others from left are: Richard Norling, asst. cameraman; Philip Martin, Jr., President and exec.-producer of Norwood Studios, and Werner Schumann, director.

NORWOOD cameraman, Raymond Pippitt, and assistant, John Schubeck, photographed ceremonies from this platform erected to left of altar and to the colorful mosaic of the Christ.

Shooting With The New Eastman High-speed

Norwood Studio cameramen, using new color film rated ASA 160, successfully photograph massive interior of the National Shrine of the Immaculate Conception for a half-hour dedicatory documentary.

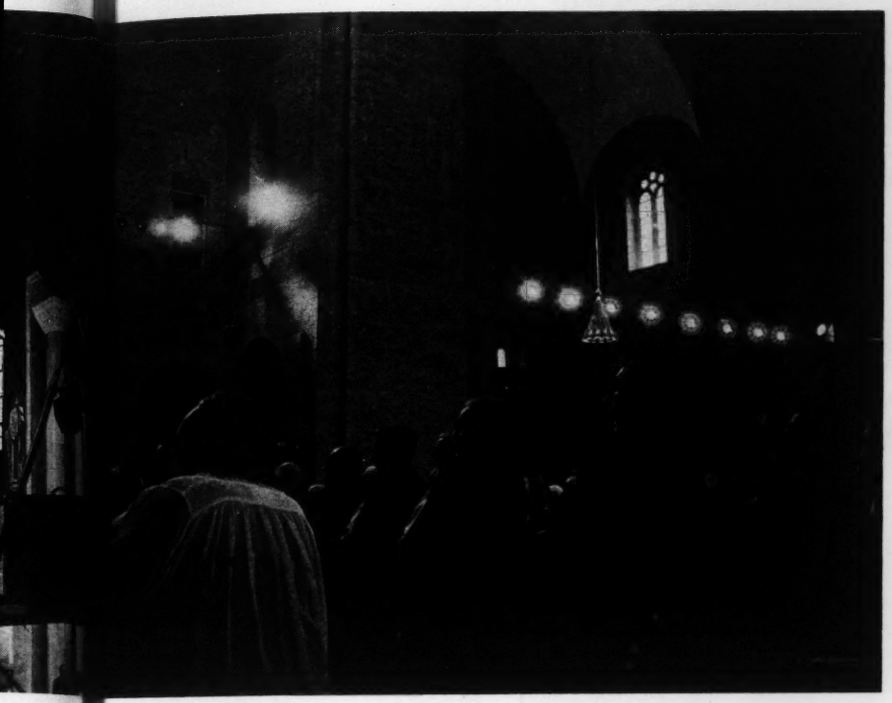
IN FILMING THE ceremonies at the recent dedication of the National Shrine of the Immaculate Conception in Washington, D.C., Norwood Studio, Inc., used, for the first time in this area, Eastman's new high-speed color reversal film, Type SO 260. The half-hour 16mm color documentary film, "Our Lady's Shrine," covers the history, construction and dedication of the shrine, whose massive interior required some unusual lighting procedures that worked out successfully thanks to the new fast color film's rating of ASA 160.

Norwood Studios completed the first tests of this new film just in time to receive by airmail enough stock to cover the dedication. It was fortuitous that the new film became available at that time, for otherwise, even with the extraordinary and massive lighting arrangements set up by Norwood, the camera crews would not have been able to film the ceremony at sound speed. Shooting at 1/50 sec., Director of Photography Glenn Johnston was able to film the interior scenes at f/3.5.

To make this speed possible, Norwood installed in the Shrine massive temporary incandescent lighting equal to the maximum requirements of 70 private homes.

Over a mile of electrical cables of varying sizes were laid. They carried more than 425,000 watts of power to eleven 10,000-watt lamps, the largest single incandescent lamp size made for the motion picture industry. These lights weigh 300 pounds each, cost $100 apiece, and accounted for 110,000 watts of electrical current used in lighting the Shrine's interior.

In addition to the eleven 10,000-watt lamps, a further 300,000 watts of lighting was used in the form of sixty PAR-64 sealed-beam lamps mounted in MasterLights and boosted to 5,000-watts each by means of a power converter. These lighting units, which weighed 8 pounds each, were strung on two 180-foot and two shorter 60-foot lengths of steel cable. The latter were stretched at a height of 35 feet between the great marble pillars on either side of the sanctuary. The 180-foot cables were suspended between the columns at the transept-nave crossing. All lighting fixtures and cables were so placed that there was no distraction of the congre-



IN THIS PHOTO, taken during the mass, may be seen two of the four cable spans suspended overhead and to which were anchored the numerous PAR-64-equipped MasterLites. Two 10,000-watt set lamps are cradled in the high niches of the Shrine's interior, augmenting the MasterLites.

speeversal Color Film

gation or interference with the ceremonies.

The permanent lighting of the high, vaulted domes of the Shrine was dimmed during the ceremonies so this illumination would not adversely affect the color photography.

Because a substantial amount of daylight normally bathes the interior of the Shrine, it was necessary to use daylight-type color film. (The new Eastman high-speed color reversal film is designed for daylight photography.) In addition, "no-color" blue filters were employed on all the incandescent lights brought in to illuminate the interior. Even though use of the filters resulted in a 50 per cent loss of light, nevertheless the resulting 5800° Kelvin illumination blended with the daylight gave perfect color rendition.

Each of the lamps—both the 10,000-watters, and the 5,000-watt units strung on the overhead cables—were individually-focused by electricians who worked atop an especially constructed 50-foot tower, and on two 40-foot "A" ladders.

A lucky observation during the planning stage of the photography was the brilliant daylight which poured through a large 6-by-20-foot window, 35 feet above the sanctuary, and which would have proved troublesome for the photographers working with the camera pointed in that direction. To prevent this unwanted light from striking the camera lenses, the window was masked with black paper.

The second camera used for filming the ceremony inside the Shrine was located to the left-front of the sanctuary. In addition, two mobile camera units with full crews were employed outside near the entrance to photograph the pageantry of the colorful processions.

Sixteen microphones spotted throughout the Shrine, carried the sound of the great ceremony to a mixing console located in the crypt. Here an engineer mixed the sound which reached the congregation through a public address system, and radio stations and other designations by way of ten external feeders leading from the console.

The sound-mixing console and the leads from the microphone positions are part of the permanent electronic equipment installed in the Shrine. Norwood engineers took the sound for the

Continued on Page 122

CAMERAMAN Ray Pippitt, atop generator-equipped station wagon, photographs exteriors prior to start of procession into the Shrine. On platform with Pippitt is scriptwriter Paul Klein, while on the ground, director Werner Schumann checks the shooting script.

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BY *Frank Cameron*
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IN ONE typical

SUNDAY, DEC

Start Service For Leasing Of Lifeboats

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The developing trend of leasing instead of purchasing capital equipment has been extended to the steamship industry in a novel form—the leasing of lifeboats.

Coast Guard safety regulations require that every commercial vessel have sufficient lifeboat space for all passengers and crew members. Lifeboats are expensive to purchase and maintain. Although they may never be used, they deteriorate and are often damaged in their davits by heavy seas.

The lifeboat

EQUIPMENT LEASING UP

Doubling of Volume in '60 Is Forecast for Industry

The $200,000,000 equipment leasing industry will more than double its volume in 1960, H. L. Meckler, president of Lease Plan International Corporation, said in a year-end statement, according to UPI.

He noted that 1959 volume was ten times that of only seven years ago.

He said businessmen were coming to realize that they could use capital outlays for another purposes when they leased equipment and that rental expenses were deductible for income tax purposes.

WANT TO EXPAND? LEASING IS THE ANSWER

Industrial leasing enables you to acquire brand new equipment now.

By JOHN FORBES

TODAY, EQUIPMENT LEASING is headline news. As evidenced by the press clippings reproduced above, a business man can lease just about anything he needs in equipment, from a typewriter to an electronic computer. Leasing, it is pointed out, is a practical and painless way of expanding and modernizing operations for many concerns. Ready cash has become such a valuable commodity today that a business needs every dollar of available assets just for such day-to-day necessities as salaries, rent, and raw materials.

Until the advent of industrial leasing, it was next to impossible for some business firms to expand without taking in a business partner, consolidating with another firm, or refinancing —because of the ready cash that would be necessary to purchase the additional equipment required. Now the ability to *lease* needed equipment instead of purchasing it solves the problem and is opening up opportunities for countless businesses to expand and take advantage of today's growth opportunities. Financial experts estimate that half the nation's business now takes advantage of industrial leasing in order to free productive working capital for more profitable use elsewhere.

It is logical, of course, that equipment leasing—with its myriad of business advantages—should ultimately find ready acceptance in the motion picture industry. S.O.S. Cinema Supply Corp. of New York and Hollywood, which for years has rented motion picture equipment as well as sold it, has announced the S.O.S. Industrial Leasing Plan, whereby qualified motion picture producers, film laboratories, animation studios, industrial in-plant film units and many others may now acquire needed equipment without tapping the company's cash reserves or working capital.

While these companies have been able to rent equipment, usually to tide them over in an emergency, now they can acquire new equipment for an indefinite period—even own it out-

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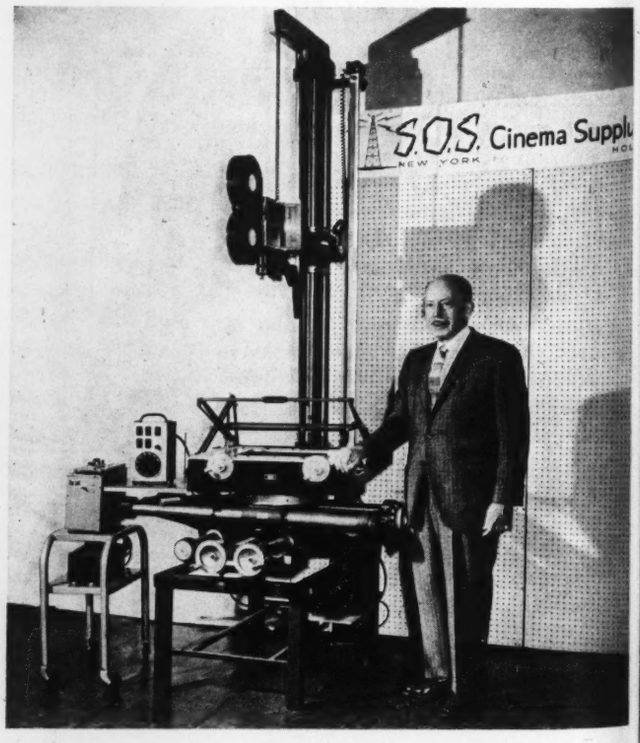

JOSEPH TANNEY, President of S.O.S. Cinema Supply Corp., points to one of the many items of major film production equipment now available from his company on lease.

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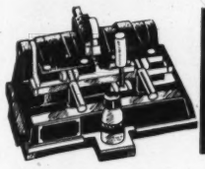

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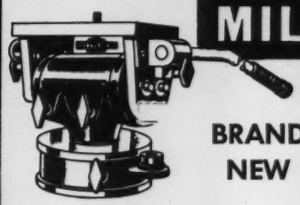

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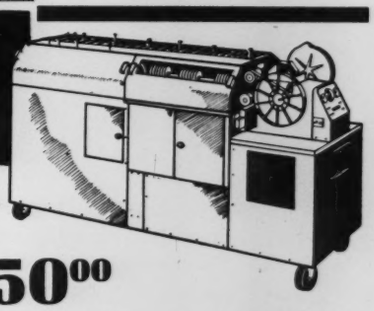

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FIG. 1—Author's basic set-up for syncnronizing tape with picture. Sync is controlled manually, according to sine wave pattern on oscilloscope, by adjusting rheostat in foreground which controls projector motor speed.

A Synchronous Quarter-inch Tape System For Film Sound Recording

From far-off India comes this idea for a tape recording system in which the control signal is recorded with the sound on the same track.

By GILBERT M. GALLOWAY

Leonard Theological College, Jabalpur, M. P., India.

ALTHOUGH SEVERAL systems are available commercially that make it possible to utilize quarter-inch tape for synchronized sound, the fact these are still somewhat expensive led the author to develop a comparable system at relatively low cost. Although the latter requires manual control of synchronization between picture and sound during some phases of recording, its provision for positive editing of tape, and its improved timing method for recording narration coupled with its compatability with systems such as Rangertone are aspects that make it fully practical.

The system described here involves the recording of a 25-cycle control signal simultaneously with the sound on quarter-inch tape. No alterations or attachments are required for the tape recorder; the control signal is integrated directly with the sound at a constant level of 10 db. On playback at normal volume levels the control signal is inaudible on audio systems operating with a flat response. As will be described later, appropriate filtering is employed to completely eliminate the 25-cycle signal when the tape recording is transferred to 16mm optical track. However, with the standard cut-off frequency for 16mm film at 80 cycles, it is obvious that this control signal would not be audible at all in the final picture track.

Twenty-five cycles was chosen for the control signal, which is half the 50-cycle mains (domestic power lines) frequency that is standard in India. For 60-cycle current, a 30- or 20-cycle frequency would be used. (For certain steps in the system, the frequency chosen for the control signal should be evenly divisible into the 50- or 60-cycle mains frequency.)

To synchronize the quarter-inch tape with picture on playback, a low and high pass filter electronic circuit is used to provide "program" material from about 50 cycles up on one channel and the 25-cycle control signal on the other channel. A simple and reliable filter consisting of 3 "valves" is used to split the signal from the tape into these two channels. Of course the "program" material can be used in any way necessary, but the 25-cycle signal is directed to either the horizontal or vertical plates of an oscilloscope. (Since an oscilloscope can be considered almost a necessity in any recording laboratory, its cost need not be considered solely for this system.)

To the opposite pair of plates of the oscilloscope, a similar signal from a projector is directed and the controls of the scope are so arranged that a sine wave (representing the 25 cycle signals from the tape and the projector) is displayed on the scope (Fig. 1). To keep the sound and picture in step, this sine wave is watched by the operator and if it starts creeping to one side of the scope or the other it is brought back to the middle by adjusting the speed of either the tape machine or the projector.

Although such procedure requires an extra person to operate the speed control, in practice it is very easy to handle. As a matter of fact, less attention and effort are required to maintain synchronization than are required, for instance, in "riding gain" during an ordinary recording session. A fairly

good analogy might be that of the effort required to drive a car down the middle of a straight road. Very rarely does the sound and picture get more than a quarter of a frame out of sync.

It has already been noted that the speed of either the projector or the tape recorder must be variable for this method of synchronization. For re-recording purposes a minimum of 3 tapes are involved—two playback and one record. It will be shown later that for most documentary film work a projector is not required, and by merely controlling the speed of one tape machine, as many as four playback tracks can be synchronized with a final recording tape. However, where a projector is required, invariably its speed must be variable and under control, and for this a means of control must be devised.

The author has experimented with a Bell & Howell 16mm Filmosound Model 185 and has found that the best control resulted by splitting up the circuits to the lamp and motor and inserting a 50-ohm power rheostat in series with the motor circuit. Also the adjustments on the governor arrangement of the motor were changed so that the motor would operate at full speed without the rheostat.

For controlling the tape recorder speed, various arrangements are possible—depending, of course, on the machine used. For recorders having shaded-pole capstan motors the speed can be changed by simply varying the voltage to the motor. For machines having synchronous motors driving the capstan, either a variable frequency power source for the motor must be provided or the capstan of such machines can be by-passed and the tape threaded through an external variable speed capstan driven by a shaded pole motor. The Author has used both methods for varying the tape speed on a Ferrograph recorder with good results. A variable frequency audio oscillator driving a 60-watt amplifier has been used as a variable frequency power source for the synchronous motor of the Ferrograph. An old, discarded deck of one of the early tape machines with a shaded-pole motor has been used as an external variable speed capstan for the Ferrograph. Everything but the capstan assembly was stripped off of the old tape deck.

Most of the details for this first step of matching picture to sound have been covered, but before proceeding to the next editing step, the method of obtaining a control signal from the projector will be described.

There are various approaches to this problem just as there are in tackling the problem of tape speed control. One method is to simply place a photoelectric cell near the film gate of the projector, which will produce a 72 cps signal (based on the fact that the shutter makes 3 light interruptions each frame, or $3 \times 24 = 72$). This frequency can be connected to the oscilloscope and compared directly to a frequency of, say, 24 cps coming from the tape.

Another method that can be used, especially on the Bell & Howell projector previously mentioned, utilizies the manual film advance shaft. A disc is fixed to the shaft, which turns at 24 rps in step with the film. The signal is obtained by punching a hole in the disc which is then scanned by a light source and photoelectric cell.

To maintain a uniform signal, which is directly related to the 50-cycle mains supply here in India, an external attachment was devised (see Fig. 4). The film is threaded through it at any convenient point. The attachment consists of a standard 8-frame sprocket wheel whose shaft turns at 3 rps ($24 \div 8 = 3$). Fitted on the other end of this shaft

Continued on Page 123

FIG. 2—A special "beep" reader was mounted on an RCA 16mm sound projector which "sensed" editing marks on film in form of short strips of foil. Latter contacts two metal "feelers" in its travel through projector, thus causing an electrical circuit to close and sending a "beep" signal to a second recorder used in editing.

FIG. 3—How a second recording head was installed on the recorder to record the "beep" signals produced by foil markers on film pictured in Fig. 2.

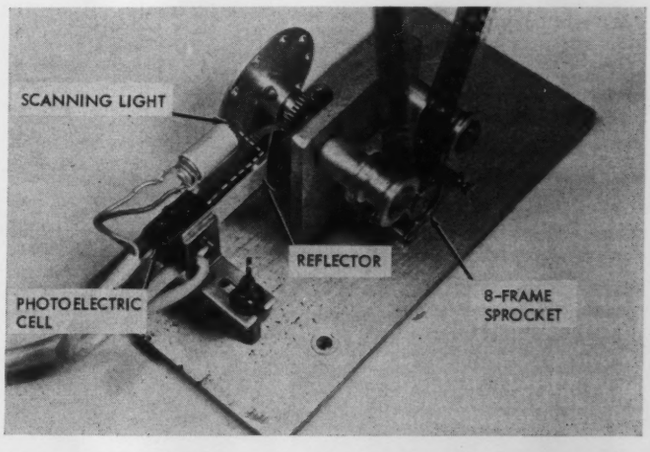

FIG. 4—Author's "50-60 cycle converter" used to provide a comparable 25-cycle signal for 16mm film in matching picture with the sound track. Dotted lines show path of light from scanning lamp, through perforation in gear, which is then reflected down to photoelectric cell.

FIG. 1—Utilizing 70mm negative, this Perkin-Elmer aerial reconnaissance camera with its unique rotating scanning prism in transparent hemisphere (bottom of camera) produces pictures having unusually high definition.

Lightweight, Thinline Panoramic Camera

Possible potential: making high-altitude BG plates.

THE SCIENCE of sprocketed film motion, electronics, and the novel use of a scanning prism have been combined with other unusual features by the Perkin-Elmer Corporation of Norwalk, Conn., in the design of a lightweight panoramic camera for wide-angle aerial reconnaissance.

The camera's relation to the field of cinematography lies in its possibilities for providing high altitude shots of great scope and high resolution for possible use as background plates for process shots.

Light in weight and readily adapted to almost any airborne vehicle, the Perkin-Elmer model 501 Panoramic Camera provides aerial photos on 70mm film of unique quality and coverage. Taken in sequence as flight progresses, each photo—which is 2.375″ by 9.425″ in size—surveys a continuous strip extending completely to the horizon on either side. This camera is specifically designed to furnish a maximum of information from any one mission. It is therefore particularly valuable in surveys where multiple aircraft sorties or complex flight paths are impracticable or too costly. Among other suitable applications, the manufacturer points out, are military reconnaissance and charting, cloud surveys,

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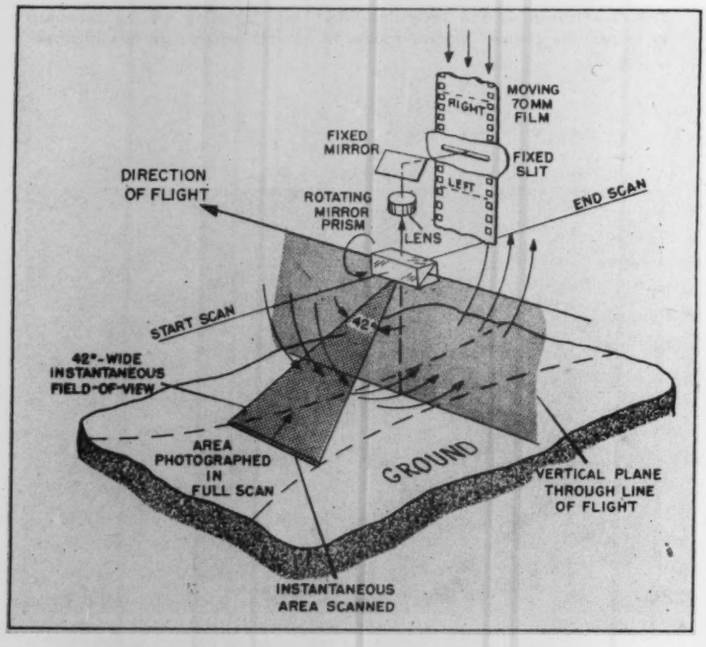

FIG. 2—Simplified diagram of camera's scanning mechanism. Light rays from ground are reflected by the scanning prism and imaged by the lens and mirror through a slit onto the film.

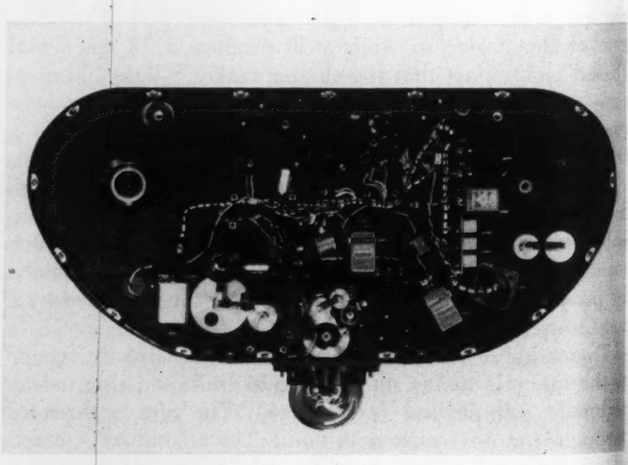

FIG. 3—Opposite side of camera. Cover is removed to show the electromechanical drive mechanism which drives the scanning prism and moves film through camera.

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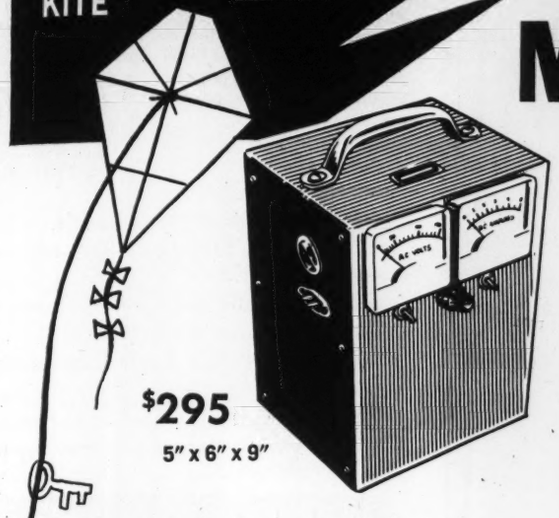

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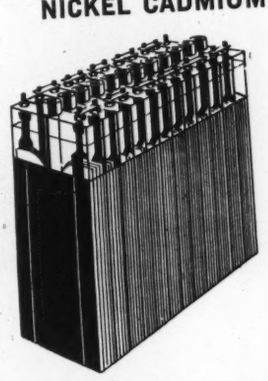

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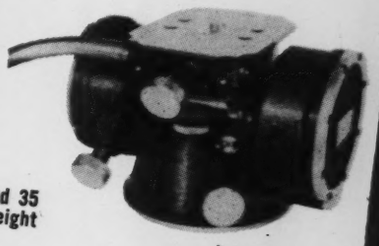

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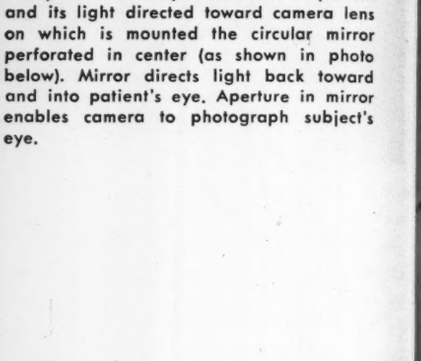
SET-UP FOR REFLEX photography of eye. Here, 750-watt lamp is set close to patient and its light directed toward camera lens on which is mounted the circular mirror perforated in center (as shown in photo below). Mirror directs light back toward and into patient's eye. Aperture in mirror enables camera to photograph subject's eye.

PATIENT'S EYE-VIEW of author and his Arriflex-16 camera with mirror-disc over lens that reflects light to patient's eye for photography.



CINEMATOGRAPHY IN OPHTHALMOLOGY

By JOHN C. OBERLY

THE COMPLEXITY of cinematography in ophthalmology arises from the fact that the subject — the human eye —must be photographed through the various optical instruments commonly used today in an eye examination, and also because lighting this subject for photography is a highly complicated process.

These observations are the result of producing and photographing for the University of Illinois Medical School "The Examination Of The Eye," a 40-minute 16mm color medical training film designed to show graphically the various steps involved in an eye examination.

In common with so many educational films, the budget for this film was extremely low (under $10,000) which precluded use of costly special effects and therefore made unusual demands upon the author's ingenuity and imagination.

The film was shot on 16mm Commercial Ektachrome with an Arriflex-16 camera equipped with 25mm, 50mm and 150mm lenses. In addition, a zoom lens and a number of supplementary lenses for extreme closeups were employed. Basic lighting consisted of one 750-watt adjustable spotlight, and a number of clip-lights.

Most of the lighting principles employed in an eye examination are equivalent to those employed in cinematography in general, but there were a few instances in the making of this film where lighting of a very special sort was required.

In the retina of the eye lie the clues to the diagnosis and treatment of many bodily ills, since here is the one place where the veins and arteries and fine capillary structure can readily be observed.

To photograph with a motion picture camera the red reflex effect of the human retina, it was necessary to devise a light-reflecting medium on the principle of the ophthalmoscope, because the retina can only be seen with the aid of co-axial light. This light-reflecting medium may be seen in the

smaller photograph on the opposite page. It consists of a circular mirror, about three inches in diameter, having a hole in the center.

This was mounted (and sometimes hand-held) before the camera lens, as shown, and a 750-watt lamp directed toward it. The now unified mirror-lens-camera was moved about slightly until the mirror reflected the light into the patient's eye. When the reflected light struck the retina in a co-axial plane, the illusive red reflex was easily visible.

For examining various parts of the eye, the ophthalmologist uses a number of different instruments, the most important of which is the ophthalmoscope. The latter is a small hand-held instrument looking something like a flashlight and having a co-axial illumination device coupled with an eyepiece with adjustable lenses for viewing the inside of the eye. For a retinal examination with the ophthalmoscope, the patient's eye is first dilated with a medicinal preparation. This relaxes the iris, causing it to "open up" so the reflective surface of the retina may be flooded with light for the examination. The ophthalmoscope is then focused from a distance of about two feet and gradually brought to within inches of the patient's eye—much the same as dollying-in with a camera. Here, the principle of focal illumination is aptly-demonstrated.

While this procedure is probably familiar to anyone who has undergone an eye examination, the image seen through an ophthalmoscope is extremely difficult to photograph clearly due to the small size of the iris opening of the eye and the necessity for avoiding strong light.

In view of this, it was decided to approach the matter in a different way: instead of trying to photograph the retina through the ophthalmoscope, it was obvious that just as effective results could be obtained by photographing an illustration of the human retina. A most realistic effect was thus achieved by holding a short length of tubing before the camera lens, as a sort of circular mask, and panning the camera over a large chart of a human retina. Because this shot was required for an instructional film, and not intended to imply an actual retinal inspection, the method employed for showing the retina was not only acceptable but productive of results far superior to any that could have been otherwise obtained.

In order to make "The Examination Of The Eye" vivid to first-year medical students unfamiliar with the subject it was necessary to employ various cinematic tricks and effects. In addition to the expedient just described, still another was used to show the "blind spot" in human vision — that tiny area in everyone's visual field that is obscured due to the entry of the optic nerve into the retina at this point.

To produce the illusion of this "blind spot" we placed a white ball, which was readily removable, on the end of a black wand. As the camera turned, the wand and ball were passed in front of the lens until the "blind spot" area was reached; the ball was then removed from the wand and, after the wand passed the "blind area," it was replaced. In printing this shot, the ball was dissolved out and then in, thus simulating the desired phenomenon quite satisfactorily.

For making general "closeups" of the eye, a 150mm Kilfitt telephoto lens was mounted on the Arriflex-16 camera, For some shots, extension tubes were also employed and these involved very careful lens setting for exposure, as the tubes involved a light loss (or reduction) of about one full stop.

To make full-frame closeup shots of individual eyes, it was necessary to over-crank the camera, shooting at speeds ranging from 36 to 64 frames per second so that the eye's slightest movement would be almost imperceptible on the screen. *Here the correct exposure and camera speed were determined by trial and error.*

For "texture" lighting, the ophthalmologist employs what is known as a "slit lamp." Using the principle of side lighting, a movable light source, positioned anywhere from 1° to 90° to the eye, casts a narrow slit-like beam of light at varying angles to the cornea and side of the eye. This side-lighting reveals the texture of the eye in a previously undisclosed view. Some of the eye's internal structure is thus visible in optical cross-section. Virtually any opacity—such as a cataract or abrasion that cannot be seen with the naked eye —is readily revealed.

To photograph a typical "slit lamp" examination, a light reading was first taken of the "slit lamp" beam and then of the patient's face. Good rendition

Continued on Page 122

150MM LENS with extension tubes on Arriflex-16 camera is centered on patient whose eye is being fitted with special magnifying lens by Dr. Eugene Folk for a scene for "Examination of the Eye," author's 16mm medical training film.

THE MARK OF A PRO

A veteran laboratory man tells the things that mark a professional job of cinematography.

By DEE D. STAFFORD

AS THE OWNER-MANAGER of a 16mm color film laboratory, I have examined millions of feet of 16mm color film shot by seasoned professionals, serious semi-pros, and not a few amateurs, and this experience has taught me a great deal about the things which distinguish the camera work of the professional from the non-professional.

Most cameramen, I think, work pretty hard to improve their work, and many of those seeking to better themselves often ask me to compare their color photography with what I consider the criteria. Here is the yardstick I use, based on three principal elements of cinematography: exposure, lighting, and camera handling.

Exposure: Hallmark of every professional cameraman is—or should be—consistently optimum exposure for every scene. Poorly-exposed scenes are inexcusable, except in rare cases. With today's wide range of fine light-measuring instruments, and the many techniques proved by years of use, the photographer who repeatedly "goofs" on exposure is on a par with the housewife who simply can't turn out a good pan of biscuits with a package of ready-mix. Good control of exposure should be learned in the "kindergarten" stage, and any cameraman aspiring to the "big time" should be very harsh with himself on this important point.

It is a complete myth that the laboratory can magically compensate for any and all errors in exposure. Nothing pleases a timer so much as a roll of beautifully exposed pictures; nothing irks him more than scenes which run the gamut of exposure variations. Truly good color prints come only from excellent original footage.

Inconsistent exposures can be a prime stumbling block, a real hurdle to success, for any serious cameraman. His goal should always be to deliver to the lab scenes which require only the minimal light adjustments—so consistent that a one-light print would yield a satisfactory series of pictures.

Color temperature control I include under the heading of "exposure," because the *quality* of light to which the picture has been exposed can be as important a factor as the *intensity* of light which produced the image.

In general commercial practice, tolerances may seem rather wide in the matter of color temperature, but my experience leads me to conclude that a color temperature meter in the hands of any purposeful cameraman can help to elevate his work above the commonplace. For, here again, the place to make corrections is at the camera, while filming, not in the lab at some later date.

General ignorance of the value of color temperature control on the part of cameramen who ought to know

Continued on Page 118

BAD PANNING continues a major fault of many cameramen, but a little concentrated practice can overcome it.

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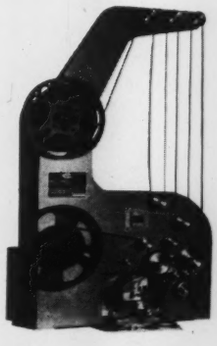

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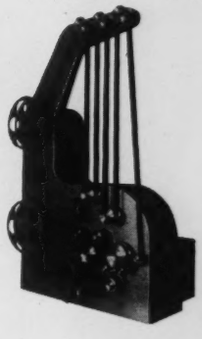

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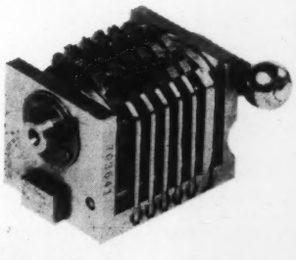

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- The numbering block generally consists of two letter wheels or one number and one letter wheel manually operated and four number wheels which move automatically and number from 0001 to 9999. All numbers can be reset by hand to begin at any desired number.
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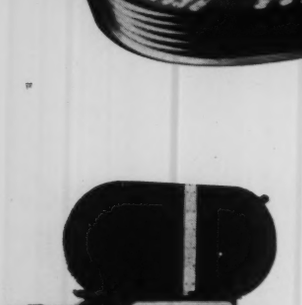

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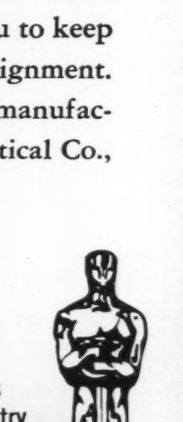

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Degrees Kelvin Versus Mireds In Color Temperature Evaluation

Designer of light measuring devices considers Mired scale more convenient than Kelvin for measuring color temperature.

By DON NORWOOD

CORRECT COLOR TEMPERATURE of the photographic illumination is just as important to shooting a 16mm industrial, training or business promotion film in color as it is to a high budget major studio color production. For unless the illumination is right, color quality of the film is bound to suffer despite the continuing improvement of color emulsons in general.

The color temperature of photographic illumination—and this includes daylight as well as sound stage and location interior lighting—has considerable effect on the quality of color photography. Sometimes this effect is advantageous, at other times, adverse. But in order to insure that the effect is desired as well as advantageous, it is the photographer's responsibility not only to know about color temperature, but to know how to control it.

On the sound stage or when shooting on location interiors, color temperature may be controlled at the light source, source of power, or both—by regulating the voltage going to the lamps, or by use of gelatin filters before the lamps. When shooting exteriors with sunlight the illumination source, color temperature of the illumination is controlled by use of certain filters (known as CT filters) placed before the camera lens. In either case, color temperature of the illuminant is determined by a color temperature meter, and the necessary correctives applied according to information established by the film manufacturer, maker of the color temperature meter, or both.

In order that these corrective measures may be properly applied in each instance, there are a number of things the cinematographer should keep in mind regarding photographic illumination. The chief illumination sources used for motion picture photography are the sun, incandescent lamps, and carbon arc lamps. All fall into the continuous spectrum classification in the science of illuminants. Each source has characteristics such that the balance of the colors therein may be classified by a color temperature rating.

A color temperature rating as a means of describing the color of an illuminant was apparently first used by Hyde

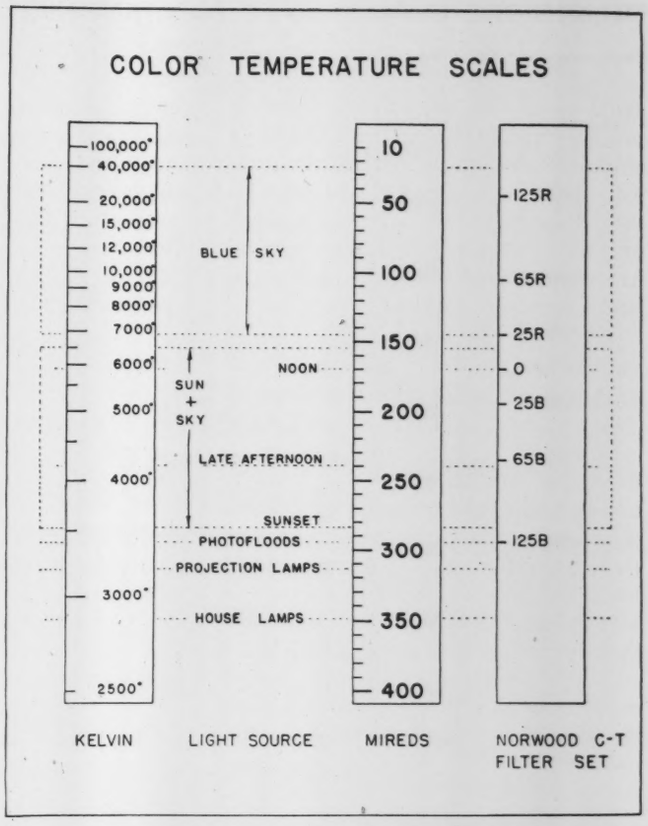

FIG. 1—Chart shows useful range of the "degrees Kelvin" scale and the relative corresponding values of the Mired scale and their relation to various types of light sources.

about 1911. Since that time this method of assigning color temperatures to incandescent bodies has come into general use. The temperature scale used was the absolute or Kelvin scale. Hence the term "degrees Kelvin" or "°K" has become rather general.

The point of most importance to a color photographer is that as color temperature changes, the ratio of red component to blue component in the illumination changes. At low color temperatures the red component is predominant. At high color temperatures the blue component is predominant. At an intermediate color temperature the red and blue components just balance. This is the condition found under noonday sunlight plus skylight. It is the condition for which daylight type color film is balanced.

The useful range of a "degrees Kelvin" scale may be seen in Fig. 1. Also shown are various illumination sources. The positions of these various sources relative to the Kelvin scale are a matter of some interest.

The Kelvin scale is quite useful for many purposes. However, it does have one serious weakness. A given color difference, such as might be caused by a filter, is not represented by the same number of degrees Kelvin when used at different parts of the scale. For example, a thin blue filter, such as may be used to change color temperature, might have a difference value of 50°K when added to a lamp burning at 2500°K, and a difference value of 3800°K when added to sky light of 20,000°K.

Continued on Page 116

FILMING THE CHARIOT RACE FOR "BEN-HUR"

Continued from Page 95

6000 extras. The horses were slowed so much we almost wasted the entire day's work—a day on which 6000 extras were paid to watch the race. We removed the crushed yellow rock and left only a 1½" layer of lava. This worked fine—and even enabled the chariots to skid around the corners.

While the set was being built and the surfacing worked out, the Yugoslavian horses underwent a spectacular change. They began to fill out, their ears perked up, their nostrils began to flare, and stubborn individual farm-horses began to be cooperating teams of four. The credit for this belongs to trainer Glenn Randall, who even had to teach the horses to react to commands and reining different from the ones they had been used to all their lives. I still don't know how Randall turned them into race-horses. Consider only the stabling of all those horses — the grooming, feeding, shoeing, and keeping them healthy.

The drivers were mostly the elite of stunt and rodeo riders from the US, but there were also some Italians. The charioteers began training as early as February, as did Heston and Boyd. The former had the easier time, for he was experienced in Westerns and has strong hands and tremendous shoulder muscles. Boyd's hands became blistered and bloody. We tried to loop the reins around his wrists, but that didn't help, for his wrists also chafed. We tried quite a few chemicals and ointments to toughen up his hands. At times he had to stop practising for a day or so to allow his hands to rest.

Three 65mm Cameras Used

I had three 65mm cameras at my disposal at all times during the shooting of the race. Except for one stand-by in Culver City, there were only two other 65mm cameras in Rome—in fact in the world. The other two in Rome, of course, were used by William Wyler.

The limitations these new cameras impose quickly became apparent. The best lens to use with 35mm film for a closeup of a charioteer that retains the horses in the picture, is a 4-inch lens (also called a 100mm lens). The equivalent of a 100mm lens in the 65mm medium is a 200mm lens. But the 200 could not be focussed closer than 50 feet, and I had to get closer than 50 feet in order to get a good dramatic closeup. So I used a 140mm lens instead and moved closer to the horses, the hooves, and the danger. For certain scenes we achieved the effect of the horses stepping on the camera car!

Heston and Boyd did all the chariot driving they seem to be doing except for two stunts. We tried out one scene with a dummy being dragged by a chariot. It didn't work. Boyd looked at the ripped and torn dummy, and asked: "Me?" I nodded. He shrugged and did it. We protected him with some steel coverings here and there on his body, but he still was bruised and abrased. However, we got a real and untricked closeup of Boyd being dragged under his own chariot.

Despite the best of precautions, accidents did occur.

Chariots Smashed Cameras

The best position to photograph a curve is at the far end as the chariots swing out of the curve. Once two chariots smashed into two of our cameras when they came out of the turn too fast. Fortunately, no horses were lost, or even lamed, and the crew and cameras were only bruised, thanks to a heavy wooden barricade we had had the foresight to erect. But the production schedule really suffered. The cameras had to be repaired and tested before we could use them again, which took several days.

One simple shot turned into a nightmare. It was a fast moving shot, but since it was a straight run and did not swing around the corners I did not expect any complications. It went this way: the camera car was followed by Heston and Boyd, at full speed, and their chariots were followed by the seven other chariots. We were in the middle of the fastest run when suddenly the motor of the camera car backfired, stuttered and died, and there we were in front of the onrushing Heston-Boyd horses, chariots, etc. I could not help recalling Zimbalist's warning when I had insisted that for realism we had to have Heston and Boyd in these shots: "If you curl one hair on their heads!"

The fine Yugoslavian horses saved the day. They swerved and missed us—all nine chariots. If any of those horses had split opinions, two going one way and two the other—but they didn't.

One of the stunts in which we used a double for Heston was as follows: We had established for the audience the fact that when a crash occurs during the chariot race workers rush out and clear the track. But when Boyd causes two chariots to go down in a spectacular double crash the workers were unable to clear the wrecked chariots off the track before Heston and Boyd complete another lap and head down the straightaway toward the wreckage. Realizing his advantage, Boyd forces Heston directly into the path of the crashed chariots. There seems to be no escape—Heston either has to pull up and lose the race, or try to take his horses and chariots over the seemingly insurmountable obstacle.

The stunt was easy to put on paper, but not at all easy to put on film.

Yet it was done. Yakima Canutt, who was wonderful in his rigging of the falls in *Ben-Hur*, allowed his son, Joe, to double for Heston in this stunt. Joe is 22 and an excellent stuntman, but perhaps a little too eager. Anyway, he started out toward the wreck at great speed and Yak and I, in one voice, screamed: "Too fast, too fast!"

Thrill Scene Unplanned

Joe, of course, could not hear us, *and was committed*. The four horses sailed over the wreck beautifully, but when the chairiot came down it hit hard and bounced. Chariot and charioteer sailed into the air. When the chariot landed again Joe was flipped into a hand-stand and thrown out between the horses. He instinctively grabbed the cross-bar between the horses, but nevertheless he was dragged some feet.

We rushed him to our emergency hospital just outside the track and a few minutes later I heard a tremendous roar from the crowd. I looked around and saw young Canutt, with only a cut on his chin (four stitches), returning to work.

His is the most spectacular stunt I have ever seen. It will do for him what the *Stagecoach* stunt — jumping between the horses—did for his father.

Naturally, the script was re-written to allow Heston to repeat the falling out of the chariot in a close shot and then to swing himself back up and go on to win the race.

In our search for new angles we tried to get the camera under a chariot, but flying dirt thrown up by the

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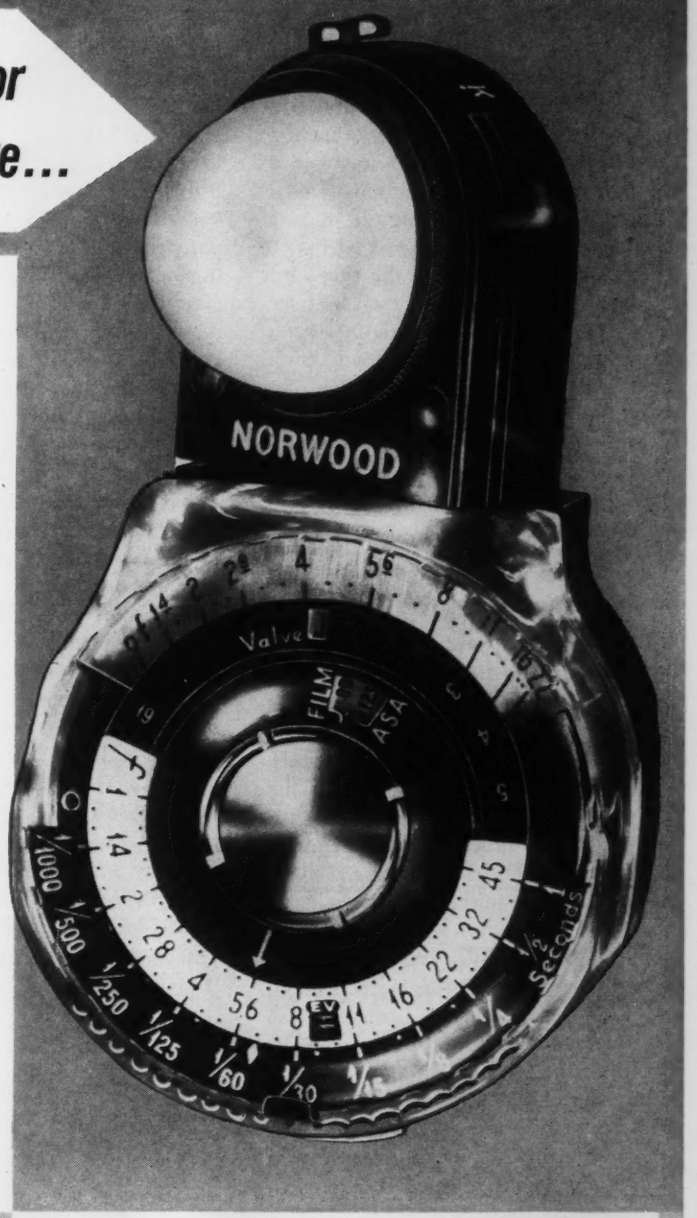

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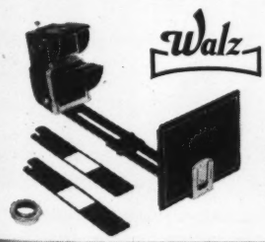

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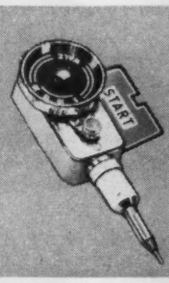

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horses' hooves kept covering the lenses. We mounted the camera behind Heston and tried to shoot over his shoulder. I found the flying dirt so heavy I had to hold a small piece of plywood over the lens until the chariots reached their fastest speed. Then I uncovered the lens and for ten seconds—until the lens was blotted out again—I was able to get a shot.

There are seven laps in the race and my detailed script for the race had six pages for each lap. Each stunt, each over-taking by Heston or Boyd, each crash, was carefully planned. Each had to take place within 23 seconds after the run started, since it took that number of seconds to run the length of the track. If a particular scene had to happen on a curve, the time allotted was even shorter.

Moving Camera Shots

After the first few days we found that, because of the arena's size, the most effective shots were the ones for which the camera moved *with* the race and *in* the race. I decided, therefore, that once the flag was down and the race began, we should participate in the race with our lens. This, of course, necessitated a rethinking of the race, as well as a rescheduling.

We did not have an actual shooting schedule. Zimbalist's orders were to make the race as good as was humanly and humanely possible. I made it as good as I humanly could in ten weeks shooting time, and also made it humanely—without the loss of a single horse or man.

Our concept of how the race should be shot somewhat resembled a musical score in that there were constant crescendos and de-crescendos.

The going around the end-curves required the camera operators—both of them Italians—to compensate for the centrifugal force encountered in the curves. The best shots on the curves were achieved not by the camera car but a specially built rubber-tired and independently sprung camera-chariot.

The heat of Rome was a serious handicap, for the horses could take only seven or eight runs a day. Each run had to be planned in detail if we were to finish the race at all with an average of only seven takes a day! Because of this, almost all scenes were done in one take. The only shot I did over was the one in which Heston's chariot runs over a centurion. At the critical moment one of the chariots got in between the lens and the falling warrior, blotting out the action.

The most difficult shot?

Toward the end of the race—when the wheels of Heston's and Boyd's chariots are interlocked, and Boyd starts to whip Heston.

In order to show the immediate danger in which they were, I decided to pan from the interlocking and splintering wheels to the two antagonists in vicious combat. To get this effect we had to chain the camera car to the two chariots. I didn't have time to realize that if one horse stumbled, the whole contraption — horses, chariots, stars, camera-car—would crash and pile up in disaster.

A pessimist, or merely a worrier, could never have directed this chariot race. And nobody could have done it without the help of MGM's propshop and special effects department.

I have been asked how the staging and directing of the *Ben-Hur* chariot race differ from those of the exodus from Dunkirk in *Mrs. Miniver* and the mountain battle scenes in *A Farewell to Arms*. It is in the *number* of separate shots. To my knowledge, never before in one motion picture were there so many *short* cuts in a sequence of 11 minutes duration. Some of the cuts are only a foot or a foot-and-a-half of film!

I was deeply gratified when William Wyler told me he thought the chariot race was one of the greatest of cinematic achievements.

But I didn't feel so good when I saw the screen credits. I share a credit-card with, I believe, five other people and am listed as one of three "second-unit directors" — the minimum credit requirement stipulated by my contract with MGM.

I cannot help thinking that if Sam Zimbalist had lived I would have received the simple credit I wanted: "Chariot race directed by Andrew Marton."

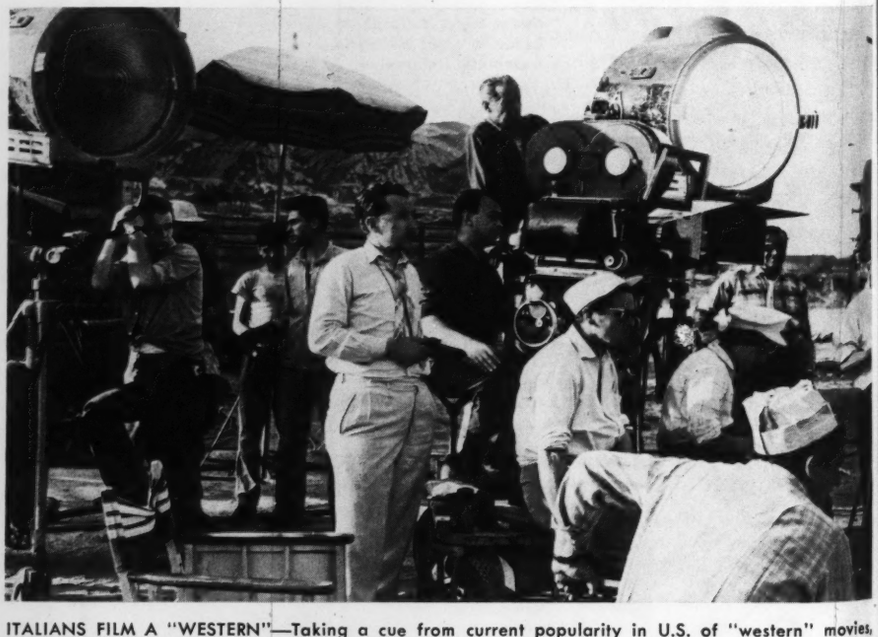
Nevertheless, if today someone asked me to tackle a similar cinematic challenge, I'd again say: "Let's go."

PANORAMIC CAMERA

Continued from Page 104

tree-census and conservation studies.

The P-E Panoramic Camera replaces the conventional bulky aerial units often employed for such applications. In place of the tri-metragon 3-camera array, for example, it provides twice the resolution at only one-eighth the weight. Its advanced optical design bypasses heavy, complicated, and expensive "fish-eye" lenses. Instead, a combination lens and continuously-rotating scanning prism "wipes" a narrow image along the film. As a result, 42°



ITALIANS FILM A "WESTERN"—Taking a cue from current popularity in U.S. of "western" movies, Betano-Film, of Rome, Italy, recently completed its first typically-American horse opera, "La Sceriffa," (The Lady Sheriff). Directing the photography in the CinemaScope format was cinematographer Sergio Pesce (standing, center). Note the modern equipment used, and especially the M-R "Brutes" used for boosters for exteriors.

x 180° coverage is achieved, and resolution is excellent even at highly oblique angles. The company offers as an example of the camera's performance a contact print of a single photo (frame) made during a 400-knot run 12,800 feet above Jamaica, Long Island, N.Y. The Atlantic Ocean is seen at the top and the Hudson River at the bottom, beyond Long Island Sound. Because of the high resolution of the print autos and trucks can be counted out to 4.5 miles, and rivers and coastlines identified to 50 miles. A tiny portion of the negative about ½-inch square was enlarged, and the resultant 5½" x 5½" print shows clearly a view of Idlewild Airfield, located nearly 60° off nadir; in spite of limitations in printing, grounded aircraft, which were 4.3 miles distant from the camera when the shot was made, can be clearly identified.

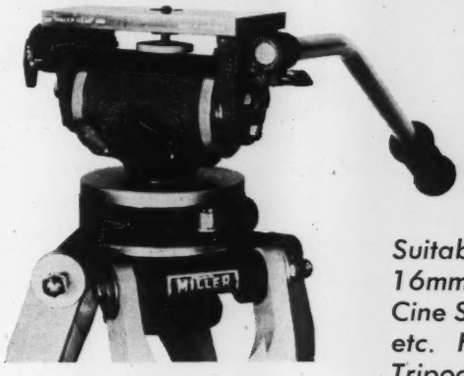
In flight, 40 lines/mm resolution is consistently obtained over the entire negative frame — a performance, the company points out, that has been achieved through exacting design and thorough attention to second-order optical and mechanical effects.

The camera's exceptional light weight and compactness result from careful choice of components, Perkin-Elmer engineers point out. The camera illustrated in Fig. 1 is the standard Model 501-B-1 with cover removed to display the film supply and storage components and the film transport system. Immediately below in the inverted transparent dome is the camera's unique opto-mechanical scanning device, which may be described roughly as the "lens" of the camera.

Weighing just 53 pounds with a full film load, the camera measures 7" in width and 36" in length. The 1000-foot film supply is regarded ample for almost any mission.

In addition to the model 501-B-1, described above, there are two other models, designated 501-K-1 and 501-K-2, which are designed to take film chambers of any capacity specified by the buyer.

With models 501-B-1 and K-1, exposure may be programmed in advance. In addition, pictures are sequenced from 2 to 64 seconds apart by a built-in intervalometer. With this device, picture-to-picture overlap of the area surveyed may be adjusted, and an excellent stereoscopic effect can be obtained. These models are intended for use with navigational systems em-



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ploying the ITT digital, alpha-numeric data recording tube. By its use, data such as time, aircraft location and altitude, frame number, and many other items may be recorded on the camera film along with the picture.

Standard equipment on all models includes an image-motion compensator to correct for aircraft motion during exposure; assuring sharp, clear pictures, it is a necessity at high speeds and low altitudes. A photoelectric automatic-exposure device is optional. Automatic film metering, fail-safe features, and stray-light and humidity protection add to the camera's convenience and versatility.

All of the model 501 Panoramic cameras employ scanning principles proven in high-speed camera operation. Fig. 2 shows a simplified view of their opto-mechanical system. Light rays from the ground are reflected by the special scanning prism and imaged by the lens and mirror through a slit onto the film. The slit confines the camera's angular field-of-view at any one instant to a thin 42°-wide fan, shown shaded in the diagram. As the prism rotates and its reflection angle changes, this field-of-view sweeps from the left-hand horizon through nadir to the right-hand horizon. The film moves correspondingly to record the desired 180° panoramic view per scan.

Picture continuity through nadir is assured by the use of the special prism for scanning. Lens focus is fixed at infinity, with focal length closely controlled to provide exact synchronism of image and film. The film is moved only during scan, being taken from a single-frame storage loop.

The camera control circuits are interlocked to insure completion of a cycle regardless of changes in control settings. Should power failure occur during either a film scan or film metering sequence, the mechanisms will complete the cycle upon restoration of power, and normal operation will be resumed. ■

LEASING IS THE ANSWER

Continued from Page 100

right following conclusion of the lease.

With some exceptions, brand new equipment is acquired on the industrial leasing plan. The transaction usually involves a contract for the continuing use of the equipment over a stated period of time. Renting, on the other hand, is more often favored for brief or occasional use—as when a company rents a crab dolly or a Mitchell camera for location work, etc.

Let us say you are a small industrial or business film producer working with a home-made or outmoded animation stand. A new modern stand with all the latest attachments would enable you to bid for more business on an equal footing with your competitors. If your credit is good and you have a satisfactory business standing in your community, you can have the new animation stand in a hurry on the lease plan.

Or take a small but prospering film laboratory badly in need of more capacity. A new, modern and speedier film processor obtained on industrial lease will enable him to meet the demands of his expanding business and insure the company's continuing growth.

Despite the apparent boom in the lease plan of quick and easy financing, there is really nothing new in the practice of either leasing or renting. What *is* new is chiefly a matter of technique. Actually, equipment leasing has been around for many years. As early as 1870 the Bell Telephone Company initiated the idea of leasing rather than selling its instruments to subscribers. Today, the list of companies that lease vital equipment, rolling stock, etc., reads like the "Who's Who" of American Industry. Indeed, many of them who are extremely important to our Nation's defense, would not otherwise have had the resources vital to the expansion of their productive capacity.

As Joseph Tanney, President of S.O.S. Cinema Supply Corp. points out, the S.O.S. Industrial Leasing Plan is in effect a financing operation which can be a tremendous boon to motion picture producers and film laboratories desiring to improve their serviecs and increase their profits. 16mm producers now can undertake a 35mm assignment without having to purchase 35mm cameras and other equipment for handling the larger film—leasing the equipment instead. Film editing departments can be modernized with latest model Moviolas; television stations can improve their news film departments with better cameras and their own film processing equipment; and almost any growing motion picture film producer can enlarge the scope of his operations, using the lease plan for acquiring equipment.

"Because of our tightening market," Says Tanney, "film executives must use every dollar invested for its greatest productivity—its greatest return. They are discovering within their own financial structure a new and important source of working capital—their financial statements. By leasing their equipment requirements they untie unproductive capital. Dollars so released are channeled into working capital. The turnover of this capital—many times a year—makes the cost of leasing relatively insignificant.

"And, at the termination of the equipment lease," Tanney concludes, "the lessee can dispose of the equipmnt, replace it with new or totally different apparatus, in which case the lease rate on the newly acquired units would be greatly reduced."

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COLOR TEMPERATURE

Continued from Page 111

Similarly, a color temperature meter might have an accuracy rating that would be expressed by plus or minus 100°K at 3000°K. But that same accuracy would be plus or minus 5000°K at 20,000°K.

In any event, the above weakness in the Kelvin scale is caused by the fact that it is not a uniform scale. As may be seen, the divisions are crowded together at one end of the scale and widely separated at the other. This weakness has been recognized by scientists. As a result, a better type of scale was set forth by I. K. Priest (a U.S. Bureau of Standards man) about 1933. That scale was divided into Mireds (micro-reciprocal-degrees).

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The Mired scale is included in Fig. 1, where the relative corresponding values on the Kelvin and Mired scales may be noted. For example, 10 Mireds correspond to 100,000°K, and 400 Mireds correspond to 2500°K, etc. The chart also shows the Mired values for various types of light sources.

Several advantages appear to be inherent in the Mired scale. For one thing it deals with relatively small figures. These are easy to read on a meter scale, easy to write, and easy to remember. The scale is uniform. Divisions are equally spaced. Hence a given color difference will always be designated by the same number of Mireds, wherever it lies along the scale. A light blue filter of, say, 25 Mireds value will always have a 25 Mireds value whether it is used at a level of 100 Mireds or a level of 400 Mireds. This feature makes the Mired scale of considerable value in color photography, where filters are used for color temperature correction.

Here, also, color temperature filters can be directly designated in terms of Mireds. They can then fulfill a definite and easily understood function in regard to changing the color temperature. A given filter will always change the color temperature of the illumination by a fixed number of Mireds. For example, if the color temperature of the illumination is 195 Mireds, and the color film in the camera is balanced for 170 Mireds, it is only necessary to use a 25 Mired blue filter to cause the proper change in the illumination color.

The ideal color temperature meter for cinematography should have provision for interchangeable scale plates, so that the cameraman may evaluate illumination sources in Kelvin or Mired degrees, according to his wishes. There is still another feature that should be a part of the ideal CT meter and that is a set of interchangeable color temperature filter scales. These, ideally, would indicate the correct filter to use for a given color temperature, and there would be a separate scale for each type color film related to the various types of illuminants—daylight, incan-

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descent, etc. Where such scales can be snapped instantly into place on a meter, they serve to show, without need for calculations, etc., what CT filter should be used to balance the illumination for the type of film being used. A typical CT Filter Scale has been made a part of the scales in Fig. 1, and it has been used successfully in the experiments the writer has been conducting in the design and improvement of a simple color temperature meter for use in cinematography.

In my work with color I have found that the direct filter type of scale, as shown at the right in Fig. 1, is by far the most useful. It is easy to use. The indications are significant and direct. Since the scale plates are easily interchangeable it is not necessary to crowd numerous confusing scales onto one scale plate. One clear, simple, easily read scale is selected and attached to the meter. This tends to prevent errors in reading.

The nomenclature for the CT filters on the meter scale has a directly applicable significance for a color photographer. The readings mean that the color temperature of the illumination is lacking in correct balance by a given number of Mireds (either red or blue). If a C-T filter, of the indicated color and number of Mireds, is attached to the camera lens the result will be correct illumination color balance for the film.

The use of this type of scale allows the photographer to make the necessary CT corrections without diverting too much of his attention from other phases of his work, which seem to always contain plenty of other problems.

Regardless of the meter used for evaluating color temperature, the fact remains that CT has become an important factor in professional color photography, and it demands of the cinematographer an extra measure of care and prudence beyond that required for black-and-white photography. ■

THE MARK OF A PRO

Continued from Page 108

convinces me that hundreds of photographers should take a more academic attitude toward their work, re-study the principles with which they are dealing, and discipline themselves to become more proficient in their craft.

Directors of photography for major studios have no monopoly on technical precision and skill. Their knowledge, and the instruments they use, have been shared with cameramen everywhere. It is no mistake to emulate these men, who rely upon good light meters and color temperature meters, and who know how to employ them for unwavering, consistent results that are the touchstone of the true professional.

Lighting: Good photography *is*—quite simply—*good lighting*. But, after years of talking to expert cameramen who really know how to light a scene, I am afraid I must leave the general rules on good lighting to someone else to enumerate. Wide variations in technique, and in the choice of lighting units, lead me to believe that it's "every man to himself" in this phase of photography.

Perhaps this is the area in which the cameraman's artistic expression has its play, and this spells an unusual degree of freedom for each cameraman to fashion his own unique form and style that will help distinguish his work.

However, no important degree of success can be his unless he works within the limits, or latitude, of his medium—color film. Lighting ratios must be observed, otherwise the cameraman defeats his own purpose.

Just as he must learn to work within the confines of his viewfinder frame, the photographer must learn to stay within general lighting ratios of not more than one-to-three between fill-light and key-light. Observing this rule is not the stark limitation it may seem and, strangely enough, it is within these boundaries that the imaginative photographer will find the greatest possibilities of expression through the use of carefully selected emphasis lighting.

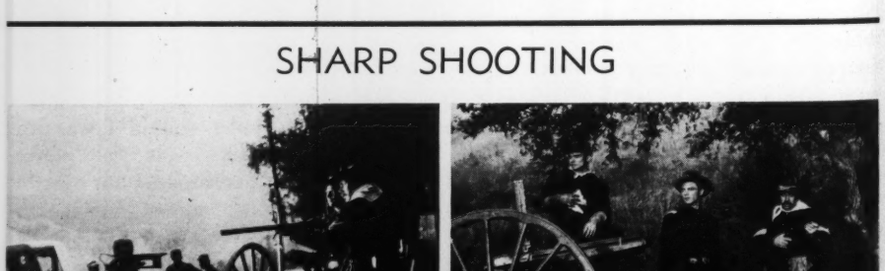
Unless it is a deliberate effect, there is nothing quite so grim as a fully lighted foreground subject photographed against a background resembling dirty crankcase oil. Vivid, natural scenes on color film are never possible unless every element within the picture frame is lighted to accommodate the ability of the emulsion.

Most careful photographers I know use a color contrast viewing glass to help them "think" the way the film will see the picture, and these men seldom violate the narrow limits of the film; yet they succeed in creating pictures of lifelike quality through subtle use of cross lighting and subdued shadows.

Silver foil reflectors are among the most simple and inexpensive devices available to every cinematographer. They often can spell the difference between a splendid and a poor exterior scene. Cameramen who consistently get the finest results out-of-doors use reflectors lavishly for fill lighting; thus, by compressing the exterior illumination to meet the requirements of color film, they achieve scenes that are "alive" with life and color.

Failure to balance tungsten-lighted scenes with visible areas receiving daylight is a more common shortcoming than the reader might believe, especially in factory films. With a

SHARP SHOOTING



CINEMATOGRAPHER Walter Strenge, A.S.C. (left of camera in photo above, left) lines up shot for "13 Fighting Men," featuring Grant Williams and Brad Dexter and recently completed for 20th Century-Fox release. Although still camera was out of focus on the background when this shot was made, not so Strenge's CinemaScope camera, which recorded the scene, pictured at right.

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supply of blue gelatin filters a cameraman can quickly balance lamps to the color temperature of the daylight falling on other parts of a scene, thus making good use of the available daylight and creating a perfectly natural-appearing scene.

Hollywood's studio photographers have been generous with their "secrets" of basic lighting; equipment capable of duplicating studio results is available for rental or purchase almost everywhere.

Important as the camera is, this tool is useless without lighting; it is in lighting a scene that the cameraman meets his greatest challenge, and enjoys his richest opportunity to be identified as a professional.

Camera Handling: When the cameraman has mastered exposure and lighting, then he is free to employ a most effectual power of the motion picture—the attitude, placement, and movement of the camera.

Reams have been written about the taboo of "panning," yet I repeatedly see "sticky," "stuttering" pans and tilts in the work of would-be professional cameramen. With gear and fluid heads available, there really is no valid excuse for offensive camera movement. Although it has probably been written a thousand times before —and although everyone thinks it applies only to the amateur—there's no escape from repeating it here: If there's any doubt about the ability to make a pan shot with super-smoothness —and oh, so slowly—*don't do it.*

Zoom lenses are capable of enhancing many scenes, but in the hands of the wrong man they can be mis-used and abused and the whole point of their real purpose entirely missed. In my opinion, there is no substitute for a good dolly shot, judiciously employed. Some cameramen argue that this requires a big dolly and a large crew, but I've seen some stunning dolly shots—often short, but effective—that were done on a three-wheel dolly by a single operator. There's something about a good trucking shot, with its depth-creating parallax effect, that elevates the "production value" of the most simple film, and which often gives special significance to an otherwise undistinguished scene.

How imaginatively the cinematographer places his camera, how he discovers methods of imparting mean-

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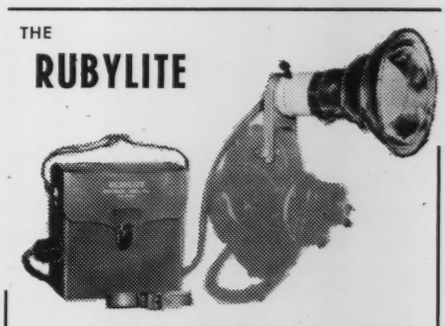

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ingful movement through mobilizing it, how he permits it to "see" things in refreshing, memorable ways—this seems to be the crowning touch that differentiates the master from the masses.

As a specialist inside the laboratory I have never worked behind the camera, yet cameramen repeatedly ask me to judge their work and make suggestions. Invariably I use as my model, the work of major studio cinematographers, believing that they have attained the highest level of artistic and technical excellence. Nearly every aspiring professional has at his disposal, knowledge and tools which can help him come astonishingly close to the standards of studio cinematographers. ■

THIS MOVIE HAS SCENTS!

Continued from Page 93

the seats just in back of and below the arm rests. As each odor is released a faint hissing sound is heard throughout the theater and a scent appropriate to the scene permeates the auditorium. The system is so precise it can control the time period of a scent down to the split second, and one odor can follow another almost immediately.

With all its lovely odors, "Scent of Mystery" is much more than just an olfactory delight. Photographically it is a *tour de force.* It's beautiful visual quality is the result of a combination of breathtaking scenic backgrounds, a superior photographic format and highly skilled talent in the camera department.

John Von Kotze is credited as Director of Photography, but one can discern the fine practiced hand of Director Jack Cardiff behind the camera. Until his recent foray into directing Cardiff was Britain's ace color cameraman and he is generally acknowledged to be one of the foremost color cinematographers of the world. His credits include "Red Shoes," "African Queen," "Caesar and Cleopatra," "Pandora and the Flying Dutchman," "War and Peace" and "The Vikings." He was awarded an Academy Oscar in 1947 for his inspired color photography of "Black Narcissus."

Unusual Camera Angles

In directing "Scent of Mystery" Cardiff has made spectacular use of the camera. The picture is packed with unusual camera angles and hair-raising point-of-view shots (a car hurtling over a cliff; a chase along hairpin mountain roads; a sequence in which huge wine casks careen down a narrow dead-end street to crush a fleeing man; and airplane flight between canyon walls that seem to graze the wing tips.)

The entire picture was shot in various locales of Spain and, according to the producer, no studio sets were used. Although some enormously difficult shooting conditions were encountered, the results were well worth the effort. In the opening sequence of the picture, the helicopter-borne camera follows a superimposed butterfly into the rose-filled garden of the Alhambra in Granada (where the audience gets first rose-perfumed whiff of scented air.) It then moves to the narrow streets of Cordoba where a chase takes place in the multi-pillared Main Mosque, called La Mezquita, built by Abd al-Rahman in the 7th Century. Incidentally, this was the first time motion picture cameras were permitted inside this ancient house of worship.

A colorful sequence takes place in Seville during the annual Feria, the most famous of Andalusian fairs, with its bull-fights, singing and dancing in the streets, and winding parades. Other scenic locales include Segovia, 3,280 feet high in the rugged mountains of Old Castile; Madreidos with its colorful windmills; Guadix, including the centuries-old gypsy caves built into the soft red clay of the mountains; Malaga with the ruined Moorish fortress Alcazabar; and the famous Gilbralfaro over which the hero of the film is pictured sliding 350 feet with his umbrella hooked to a radio tower cable!

The chase moves on through the ancient Roman village of Ronda, cut in two by a 600 foot gorge and spanned by a single stone bridge built by the Romans centuries ago. It then continues along a terrifying catwalk that clings precariously to the sides of sheer cliffs. A climactic sequence develops in Pamploma during the feast of St. Firmin when bulls are let loose in the streets and local sportsmen run for their lives through the town and in the bull ring.

All this color and spectacle was faithfully captured on film by means of the new Todd Process 70mm Camera. This is a relatively light and versatile wide-film camera developed especially for the Todd organization during the past three years by the Mitchell Camera Corporation. It is equipped with special lenses which are completely free of distortion and barreling effects and which have unusual depth of field. One of the cameras is a special high-speed model, the first of its kind to use 70mm film. Accessory equipment to these cameras includes various focal lenses, telephoto lenses, tripods, remote-controlled focusing, giant cranes and a fifty foot camera tower.

Color film shot on location for "Scent of Mystery" was developed in Barcelona, and forty-eight hours later Producer Todd viewed rushes in the projection room in his Malaga headquarters. From there the selected "takes" went to the cutting room (also installed in Malaga) for final editing. Prior to this, the time lapse between exposure of the film and viewing of the rough print for cutting would take anywhere from a week to a month depending on the distance from the location to the nearest processing lab.

8-Channel Sound System

No less impressive is the remarkable Todd-Belock 8-channel sound system which provides the sound accompaniment to "Scent of Mystery" in true stereo aspect through a series of speakers that ring the theatre auditorium. The potentials of this sound system is impressively demonstrated in a sequence of the picture which reveals a native festival where several isolated groups of singers and musicians perform over a vast outdoor area. Here the microphone system panned the scene in a 360-degree arc, changing perspective constantly and blending the separate melodies into a magnificent montage of sound.

Imagination and superb technology combine to make "Scent of Mystery" genuinely entertaining for any audience. And while perfuming pictures may not become a new trend in Hollywood, Todd's venture is of more than passing interest to film makers everywhere. Put it on your list of pictures to see.

PHOTOGRAPHIC ASSIGNMENTS

Continued from Page 90

ROBERT SURTEES, ASC, "Cimarron" with Glenn Ford and Maria Schell. Anthony Mann, director.

N.B.C.

ALAN STENSVOLD, ASC, "You Bet Your Life"* with Groucho Marx. Bob Dwan and Bernie Smith, directors.

PARAMOUNT

LESTER SHORR, ASC, "Bonanza"* (NBC-TV) with Michael Landon and Dan Blocker.

JOHN RUSSELL, ASC, "Psycho" (Alfred Hitchcock Prods.) with Anthony Perkins and Vera Miles. Alfred Hitchcock, director.

LOYAL GRIGGS, ASC, "Walk Like a Dragon" with Jack Lord and Nobo McCarthy. James Clavell, director.

REPUBLIC STUDIOS

LUCIEN BALLARD, ASC, "Richard Diamond Private Detective"* (Four Star Prods.) with David Janssen.

GORDON AVIL, ASC, "Wanted Dead or Alive"* (Four Star Prods.) with Steve McQueen.

CARL GUTHRIE, ASC, "Johnny Ringo"* (Four Star Prods.) with Don Durant.

EDWARD CRONJAGER, ASC, "Winchester"* (Four Star Prods.)

GLEN MACWILLIAMS, ASC, "The Rifleman"* (Four Star Prods.) with Chuck Connors and Johnny Crawford.

KARL STRUSS, ASC, Commercials* (Four Star Prods.)

EMMETT BERGHOLZ, "Troubleshooters"* (Filmaster Prods.) with Keenan Wynn and Bob Mathias. Robert Altman, director; "Death Valley Days"* (Filmaster Prods.)

REVUE STUDIOS

MACK STENGLER, ASC, "Leave it to Beaver"* (Comalco Prods.) with Barbara Billingsley and Hugh Beaumont. Norman Tokar, director; commercial*.

BENJ. KLINE, ASC, "Wagon Train"* (Revue Prods.) with Ward Bond.

WILLIAM SICKNER, ASC, "The Deputy"* (Revue Prods.) with Henry Fonda.

RAY RENNAHAN, ASC, "Laramie"* (Revue Prods.)

RUSSELL METTY, ASC, "Portrait in Black" (Color; Universal International) with Lana Turner and Anthony Quinn. Michael Gordon, director.

LIONEL LINDEN, ASC, WILLIAM SICKNER, ASC, "Overland Trail"*.

JACK MACKENZIE, ASC, "The Deputy"* (Revue Prods.) with Henry Fonda.

ELLIS THACKERY, ASC, "Johnny Midnight"* (Revue Prods.)

LIONEL LINDON, ASC, "Fred Clark Show"* (Pilot; Revue Prods.) "General Electric Theatre"* (Revue Prods.)

JOHN WARREN, ASC, "Ford Special"* (Color; Revue Prods.)

NEAL BECKNER, "Alfred Hitchcock Presents"* (Revue Prods.); "Staccato"* (Revue Prods.)

RAY CORY, ASC, "Bachelor Father"* (Bachelor Prods.) with John Forsythe.

IRVING LIPPMAN, Commercials* (Revue Prods.)

TWENTIETH CENTURY-FOX

ELLSWORTH FREDRICKS, ASC, "Wild River" (C'Scope & Color; shooting in Tennessee) with Montgomery Clift and Lee Ramick. Elia Kazan, director.

LEON SHAMROY, ASC, "Wake Me When It's Over" (C'Scope & Color; Mervyn LeRoy Prods.) with Ernie Kovacs, Dick Shawn and Margo Moore. Mervyn LeRoy, director.

ARTHUR ARLING, ASC, "Story of Ruth" (C'Scope & Color; S. G. Engle Prods.) with Elana Eden and Stephen Boyd. Henry Koster, director.

LEO TOVER, ASC, "From the Terrace" (C'Scope & Color; shooting in N.Y.) with Paul Newman and Joanne Woodward. Mark Robson, director.

WALTER STRENGE, ASC, "13 Fighting Men" (C'Scope; API) with Grant Williams and Brad Dexter. Harry Gerstad, director.

KAY NORTON, "Valley of the Redwoods" (C'Scope & Color; API) with John Hudson and Lynn Bernay. William Witney, director.

FLOYD CROSBY, ASC, "12 Hours to Kill" (API) with Nico Minardos and Barbara Eden. Edward Cahn, director.

DANIEL FAPP, ASC, "Let's Make Love" (C'Scope & Color) with Marilyn Monroe and Yves Montand. George Cukor, director.

LLOYD AHERN, ASC, "Adventures in Paradise"* with Gardner McKay and Weaver Levy.

WILFRID CLINE, ASC, "The Tate Series"*

WARNER BROS.

JAMES DROUGHT, Commercials*

JACK HILDYARD, "The Sundowners" (Technicolor; shooting in Australia) with Deborah Kerr and Robert Mitchum. Fred Zinnemann, director.

MARK DAVIS, ASC, Commercials*.

HAROLD STINE, ASC, "Bourbon Street Beat"* with Richard Long and Andrew Duggan.

HAROLD STINE, ASC, RALPH WOOLSEY, ASC, "77 Sunset Strip"* with Efrem Zimbalist, Jr.

WILLIAM DANIELS, ASC, "Oceans 11" (Technicolor; shooting in Las Vegas) with Frank Sinatra and Dean Martin. Lewis Milestone, director.

RAY FERNSTROM, ASC, WESLEY ANDERSON, "Maverick"* with James Garner.

WESLEY ANDERSON, PERRY FINNERMAN, "Sugarfoot"* with Will Hutchins.

EDWIN DUPAR, ASC, "Hawaiian Eye"* with Anthony Eisley.

J. PEVERELL MARLEY, ASC, EDWIN DUPAR, ASC, "Bronco"* with Ty Hardin.

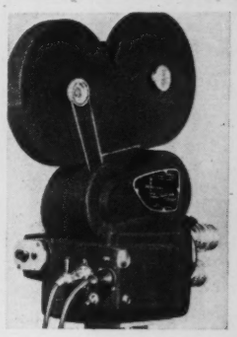
BURT GLENNON, ROBERT HOFFMAN, "The Alaskans"* with Roger Moore and Dorothy Provine.

ELLIS CARTER, ASC, RALPH WOOLSEY, ASC, "Lawman"' with John Russell.

PERRY FINNERMAN, "Cheyenne"* with Clint Walker.

TED MCCORD, ASC, Commercials*.

HAL MOHR, ASC, Commercials*.



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FILMING THE EYE

Continued from Page 107

was achieved by setting the exposure mid-way between the readings.

Because this 40-minute medical training film was concerned with teaching the basic concepts of examining and diagnosing the human eye, it necessarily involved two types of illumination: first, the photographic illumination that was necessary to photographing the picture, and, second, the illumination and, more specifically, the illumination problems, usually encountered by the ophthalmologist in modern-day eye examination. The first has been dealt with in preceding paragraphs; the second was merely a part of our basic subject and the problem was how best to picture the various types of lighting and its methods of application in eye examinations. It was felt that such lighting could best be demonstrated to medical students by means of a motion picture, and therefore was emphasized in the various key scenes throughout.

"The Examination of the Eye" was financed through the University of Illinois Eye Infirmary by an educational grant from the National Institute of Health. While not a big-budget production, it is estimated that the film will quickly pay for itself through time saved in teaching hours. ■

QUESTIONS & ANSWERS

Continued from Page 86

the two exposures join together) while another will require a fairly sharp matte edge.

The closer the matte or mask is to the camera lens, the softer will be the line or lines of demarcation; the farther away it is, the sharper it will be. Using a small lens opening will also sharpen the line.

Q What is the best procedure to follow to re-record sound for a scene where the present sound track is unsatisfactory—*J.H.*

Answer: Where exact synchronizati of replacement lines is desired, mo studios use both a picture and a sou loop of the scene involved. In prepar tion for the dubbing take, the sound reproduced both through a speak and earphones in sync with the proje ed picture. The actor watches the pi ture, listens to the sound, and reads t dialogue in sync with what he hea and sees.

The speaker is then cut off and t microphone switched on so that t sound mixer and the director can hea the actor's words. Meantime, the sou recorder is started and when a satisfa tory reading is obtained (and record ed) the respective take is marked fo dubbing.

The important reason for projectin the picture is that the director ca check actor's sync and dramatic ex pression during the recording to in sure a satisfactory take.

SHOOTING WITH NEW FILM

Continued from Page 99

documentary it produced from one o the ten exterior feeders.

The first 14 minutes of the half-hou film depicts the history and constru tion of the Shrine. This part of the fil was shot simultaneously in black-and white and color. A 14-minute versio in black-and-white was completed an shown on TV stations throughout th country prior to the dedication.

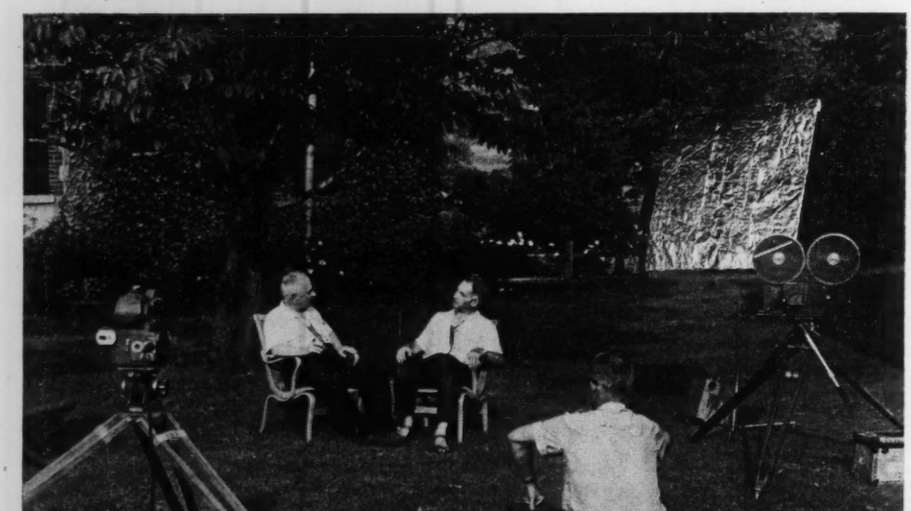
Norwood's four camera crews sho more than 5,000 feet of color film t record the ceremony. This was edited down to 16 minutes and combined wit 14 minutes of color film on the histor ical prologue.

It took the Norwood production staf one month to make the necessary ar rangements (including running heav special wire feeders) and a week to se and anchor the rigging.

Production for the sponsor, the Na tional Conference of Catholic Men, was directed by Executive Producer Martin H. Work, assisted by Richard J. Walsh, Producer; Richard Gilman, Script; and Robert Gerringer, Narrator.

Acting for Norwood Studios were Philip Martin, Jr., Executive Produc er; Werner Schumann, Director; Glenn Johnston, Director of Photog raphy; and Carl Fowler, Film Editor. In the 24-man crew were 4 camera men, 3 soundmen, 5 electricians, 5 grips, and 3 assistant directors. ■

FILMING UNDER THE ELMS



INTERESTING CAMERA SET-UP in which two Auricon 16mm cameras were used by cameraman Jim Bauer of the film production department of KUHT-TV, University of Houston (Texas) to record interview of two prominent biologists at a recent convention. Scene was opening for University's 45-minute color film, "Speciation," evolutionary process by which species are formed. Subjects are Dr. Theodore Tobzhansky (left), Columbia Univ., and Dr. Ernst Mayr, Harvard. Directing scene is Dr. H. Burr Roney, Univ. of Houston.

SYNC TAPE SYSTEM

Continued from Page 103

is a 50-tooth gear which engages a 60-tooth gear. The ratio here is 5 turns for the 60-tooth gear to 6 turns of the 50-tooth gear; therefore the speed of the 60-tooth gear is exactly 2.5 rps when the film speed is 24 f.p.s.

In the 60-tooth gear, 10 holes are drilled and are scanned by a light and photoelectric cell which results in a 25 cps signal derived from the 16mm film when it travels at 24 f.p.s.

Any approach that the author is aware of to edit sound on quarter-inch tape directly against 16mm film is, to say the least, rather tedious and impractical.

The ordinary method of having sound and picture on two or more separate, sprocketed tracks interlocked by a mechanical synchronizer, seems to be the only practical method at the moment.

Oscilloscope Aids Editing

The first step toward editing quarter-inch tape in this manner is to record the material from the quarter-inch tape to 16mm magnetic film, synchronously. This can be done using the processes already described for synchronizing a tape machine and a 16mm machine by means of control signals displayed on an oscilloscope, and manually adjusting the speed of one or the other of the machines. Any one of the combination 16mm optical-magnetic projectors now on the market can be used for the purpose and a control signal gotten from the projector in the same manner as described above for synchronizing purposes.

Because of the cost of 16mm magnetic film stock and the loss of quality that results from each transfer step, the 16mm magnetic track becomes the dummy track and is used for editing purposes only, not in any re-recording process.

This of course ultimately means editing the quarter-inch tape. The system of synchronous recording from tape to film described above provides that edit "marks" can be "recorded" synchronously from 16mm back to the quarter-inch tape.

The edit "marks" or notations consist simply of little strips of aluminum foil applied to one surface of the dummy magnetic film by means of masking tape as shown in Fig. 2. These edit marks can be quickly stripped off after the dummy magnetic film has been recorded on the quarter-inch tape and the magnetic film made ready for reuse.

The edit marks of aluminum foil are made one frame in length. Their purpose is to close an electrical contact which in turn feeds a 2000-cycle beep tone to a special recording head mounted on a second tape recorder. The resulting beeps on the original quarter-inch tape mark the exact spot where the tape should be cut to match the picture.

To accomplish this procedure, a special pair of contacts were made and mounted on an RCA magnetic projector, as shown in Fig. 2, and an extra head mounted on the tape recorder (Fig. 3). Actually, this extra head was a discarded one in which the erase section was still operable. The distance relationship between the pair of contacts on the RCA projector and its playback head and the distance between the extra head on the tape machine and its own playback head was made the same so that when a beep signal was recorded it would arrive at the playback head of the tape machine in sync with the arrival of the foil strip on the head of the RCA machine.

The pair of contacts shown in Fig. 2 are so arranged that they touch only the center of the magnetic film. Also, the aluminum foil strips are placed in the center of the film so there will be no undue wearing of the magnetic track.

An audio oscillator is used to generate the 2000 cycle beeps. Its output, if necessary, can be amplified and fed to the extra head. In the author's arrangement, the output of a Heath Kit audio oscillator is amplified through a 5-watt amplifier and fed to the erase section of the extra head from a 4-ohm output. This output circuit is connected to the head through the contacts mounted on the RCA projector. Thus the foil strips close the circuit to record the beep one frame in length on the tape. No erasing current or bias is needed in the extra head in addition to the 2000-cycle current. For this operation the speed of the tape machine is varied to achieve synchronization with the RCA magnetic projector. The author has also successfully applied this idea to a Bell & Howell 16mm projector where slightly different physical arrangements were used.

It is interesting to note that with this

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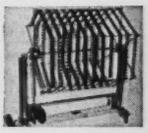

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set-up, basic synchronization between film and tape is achieved by use of the sine wave on the oscilloscope and at the same time an aural check for synchronization may be made, since both the film and the tape are played back simultaneously. Also each time a beep mark is recorded by the extra head it is, of course, immediately played back by the regular playback head of the machine thus affording a continuous check of the edit beep recording.

After running the entire tape through in synchronization with the dummy magnetic film, it is again run through a tape machine, the beep marks located, and marked with a grease pencil in such a way that the good sections of tape are noted. (This may be in the form of a line marked at the place where the cut is to come and a "squiggle" marked on the tape to be discarded.) After the complete tape has been thus marked, it is transferred to a film editing table and the splices made.

Foil Method Reliable

Severeal points arise here that need further explanation.

First, splicing the tape does not effect the use of the control signal on the oscilloscope. At most, the sine wave on the scope face jumps a bit but this does not give the operator any particular difficulty. Secondly, the method of applying the edit marks on the film may be done in other ways than by the aluminum foil method; however, the foil method has proved very reliable, allows re-use of the film, and does not take up too much time. About one hour is required to position the edit marks for either a narration track or a music track for a 20 minute documentary film. Later the edit marks can be removed from the film in about 10 minutes. Tape recorders having separate record and playback heads could be used for this beep mark operation. The author experimented with a Magnacorder Model PT 6A and found it gave good results with the output of the oscillator connected to the record head and set at 0 db at 600 ohms; however, it was finally decided to use an Ekotape fitted with an extra head because of the convenience in speed control the Ekotape offered.

There are special editing problems in connection with narration recording. One method of recording a narration track for this system that has worked out with good results is to first record the narration straight without the picture, trying only to get the proper pace and feeling into the various speeches. The resultant tape, with its inevitable retakes, etc., is then edited so that a spliced tape is obtained having "perfect" narration in the correct sequence. This tape is then re-recorded to a second tape along with the control signal and any equalization that might be necessary. Timing of the narration is either against time or against picture projected in synchronization with the control signal. This, of course, requires starting and stopping the original narration tape. Again this can be done very easily using the Magnacorder mentioned above. The pressure roller on the capstan need merely be lifted manually to stop the tape and allow for proper timing. This method eliminates any clicks or pops or slow starts that might result from the use of the normal start-stop switch on the machine.

There is another method of narration timing that utilizes the various aspects of this system in a unique way. Narration timing at best is rather a tense procedure whether against picture or against time. If it is against time, then a great deal of mental gymnastics are required of the stop-watch keeper, especially so if correct timing is tried during the first recording and if the narrator fluffs. This means backing up either picture or stop watch, with all the attendant confusion. Fluffs seem inevitable for even professional narrators, so any system should anticipate such mistakes. The following procedure takes care of such narration timing problems in an almost automatic way and permits the use of the original narration tape for re-recording directly to the final mixed track.

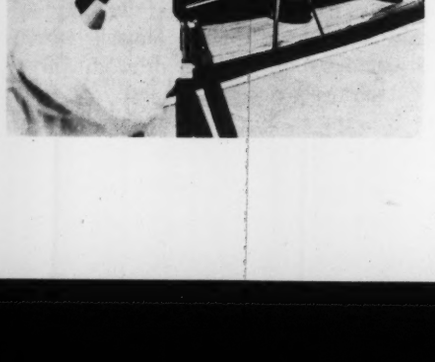
First, the script for the film is prepared with each speech given a number. Preliminary timing by the editor is done against picture to determine if the speeches fit the length of the scenes and if any of the speeches run together—that is, do not have pauses between them. With this information, the dummy magnetic film is run against the picture on the edit table and an "edit mark" placed on the dummy film where the beginning of each speech should come in reference to the picture film. Speeches that come one after the other without pause need not be marked. Also the start mark of the picture is noted on the dummy film with an edit mark. Finally the script is red-pencilled at each speech thus marked on the dummy film and all scripts used during the recording session are so marked.

Role of "Beep" Marks

Next a "narration timing tape" is run off with three items of information on it: 1) a 24-cycle control track at -7db (so as to have spare re-recording volume level) is recorded in sync with the dummy film; 2) the beep marks from the dummy film are recorded, including the one for the start mark; and 3), a voice-recording of the number of each beep mark is made on the tape, each number corresponding with the number of each speech of the script. These three items of information are recorded simultaneously. The beep marks are recorded through a regular input channel rather than through any special connection as for other editing procedures.

Continued on Page 126

A 16MM FILM FOR BOATING SAFETY



CAMERAMAN ARTHUR GARATTI of the Photographic Bureau of Aetna Casualty and Surety Company, Hartford, Conn., used a Cine-Special to photograph much of the footage for "Outboard Outings," company's color film on boating safety, which was narrated by TV star Garry Moore, subject of Garatti's camera here. Aetna Casualty, incidentally, is one of the nation's leaders in company-produced motion pictures. An earlier film, "Paddle a Safe Canoe," won a Golden Reel Award of the Film Council of America as the best safety film of the year.

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SYNCHRONOUS TAPE RECORDING SYSTEM

Continued from Page 124

At this point the narrator may be called in. The "narration timing tape" is put on a playback machine and cued to the start mark, and a fresh tape is put on the recording machine, cued up to a pre-recorded start mark.

The "narration timing tape" is run through the 2-channel filter and the low frequency control signal (which was previously recorded at a comfortable level) is re-recorded directly onto the narration tape at the standard level of -10db, thus keeping the two automatically in sync. The timing beeps and accompanying speech numbers are fed from the high pass channel to headphones worn by the narrator, or by an assistant employed to cue the narrator. Whenever a speech is fluffed, both tapes are stopped; but only the timing tape need be backed up to the beep mark indicating the beginning of the speech. Since the beeps are numbered, there is no possibility of any confusion arising. This simple operation done, the recording is continued from the beginning of the speech where the mistake (or fluff) occured. For ease in editing the script is marked at the point of the mistake.

After the narration has been recorded, the mistakes are edited out. Proper timing is maintained by running the tape to the beginning of a speech containing a mistake, or even up to the mistake itself, cutting the tape at that point and splicing in the good take at the same point.

When the narration track has thus been edited it is properly synchronized to picture and is ready to be re-recorded to the final mixed track.

Such procedure can also be adapted for use on Rangertone record-playback equipment.

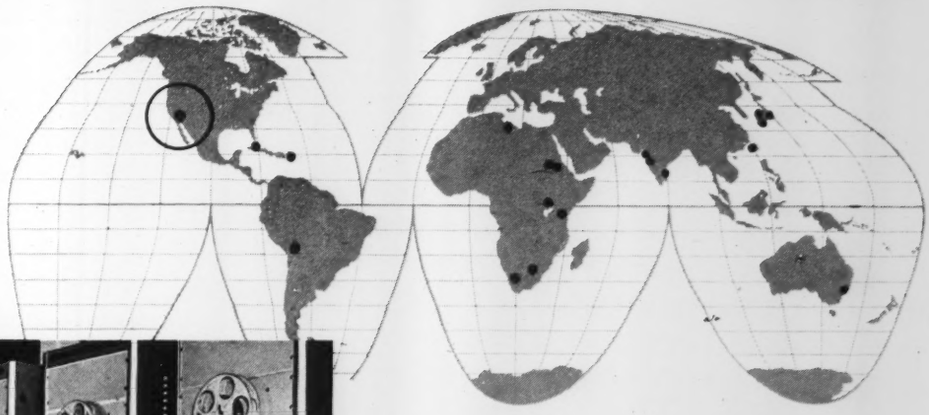
Preparation of a music or effects track is even simpler. The music or effects or silent spaces are noted down in order, together with their respective lengths of time, from beginning to end of the picture.

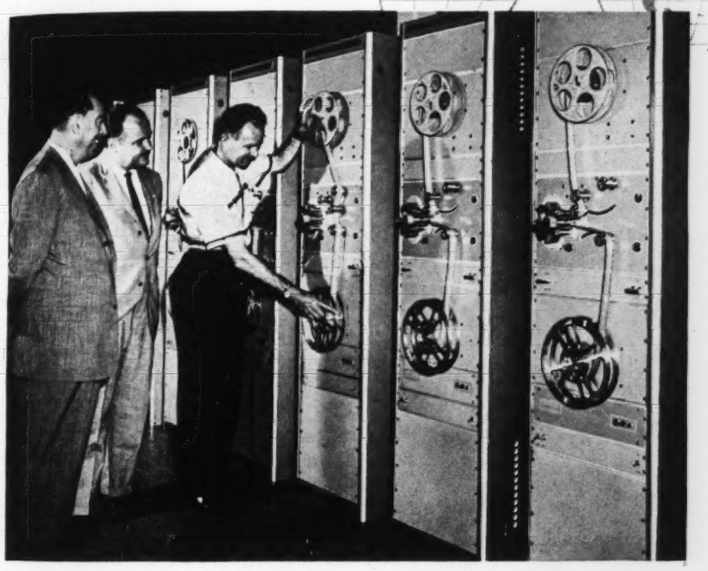
These are recorded on tape along with a control signal. Silent sections are "recorded" in sequence also. The best procedure seems to be to over-record, time-wise, each section of music, effects, or silence. Then the entire tape is recorded to dummy 16mm magnetic film. The exact beginning and end of each section is found on the regular edit table by matching this dummy film to picture and making edit marks on the dummy magnetic film. The edit marks are transferred back to the original quarter-inch tape and the tape spliced accordingly. The result is a finished music or effects track the exact length of the film.

By over-recording each section, time-wise, as mentioned above, it can be seen that matching certain beats of music within a selection of music to certain frames can easily be accomplished. Also there are no problems of matching the end of a piece of music with "The End" of the picture.

Special problems of lip-sync recording will be discussed in a subsequent article.

AROUND THE WORLD WITH MAGNASYNC





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